Autophagy and The Aging Immune System

Hussein Sheashaa, MD, FACP

Professor of Nephrology, Urology and Nephrology Center and Director of Medical E-Learning Unit, Mansoura University and Executive Director of ESNT-Virtual Academy: http://lms.mans.edu.eg/esnt/

Urology and Nephrology Center

7- 8 October 2015

Egyptian Transplantation Society

2nd Organ Transplantation Congress

Optimizing The Clincal Practice

Cairo Marriott

Focus of The Talk

- Introduction
- Types and crosstalks
- Dysfunction and consequences
- Autophagy, immunity and immunosenescence
- Autophagy and mTOR
- Autophagy and transplantation
- Regulation

Urology and Nephrology Center

Autophagy pres 7.10.2015

Search Aut...

Organize | Include in library | Share with | New folder

(S)-Goniothalamin induces DNA	a Cyclosporine A-induced	A review of the equine age-related c...
Activated platelets present high mo...	Activation of RARα induces autopha...	Activation-induced and damage-ind...
Active autophagy but not lipophagy...	Adiponectin Stimulates	Adult Atypical Sporadic Burkitt Lym...
AMPK and autophagy in glucos	An atypical necrotic signal induced by	Antimicrobial Autophagy
Apelin-13 Impedes Foam Cell Forma...	Autophagic activity as an indicator f...	Autophagic response to cell culture ...
Autophagosome maturation is impa...	Autophagy activation reduces renal ...	Autophagy activation reduces renal ...
Autophagy and Apoptosis	Autophagy and autophagy-related p...	Autophagy and autophagy-related p...
autophagy and cancer	Autophagy and Ionizin	Autophagy and Liver Ischemia-Repe...
Autophagy and metabolic changes i...	Autophagy and metabolic changes i...	Autophagy and the kidney (2)
Autophagy and the kidney rev	Autophagy and the Kidney	Autophagy Basic Principles and Rele...
Autophagy Controls Acquisition of ...	Autophagy Controls Acquisition of ...	Autophagy Definition Molecular
Autophagy facilitates cytokine-indu...	autophagy flux	Autophagy for Tolerance Induction i...
Autophagy fosters myofibroblast dif...	Autophagy Guards Against IRI and t...	Autophagy in autoimmune disease
Autophagy in Cancer Stem Cells	Autophagy in granular corneal dystr...	Autophagy in immunity
Autophagy in light-induced retinal d...	Autophagy in renal diseases	Autophagy in Renal Ischemia-Reperf...

257 items

Urology and Nephrology Center

Home > List of Issues

Browse journal

View all volumes and issues

Current issue

Latest articles

Most read articles

Most cited articles

Open access articles

Submit

Subscribe

About this journal

News & offers

Autophagy

Taylor & Francis

Sample this title

Alert me

ISSN
1554-8627 (Print), 1554-8635 (Online)

Publication Frequency
12 issues per year

Add to shortlist   Recommend to: A friend A librarian

List of issues

Latest articles

- Volume 11 2015

Issue 9 2015 pages 1441-1708

Issue 8 2015 pages 1197-1439

Issue 7 2015 pages 973-1195

Issue 6 2015 pages 865-971

Journal news

Advertise in *Autophagy*

2014 Impact Factor: 11.753

Sign in here
to start your access

Most read   **Most cited**

Guidelines for the use and interpretation of assays for monitoring autophagy
Daniel J. Klionsky, et al.
Volume 8, Issue 4, 2012

How to Interpret LC3 Immunoblotting
Noboru Mizushima, et al.
Volume 3, Issue 6, 2007

Oxidative stress induces autophagy in response to multiple noxious stimuli in retinal ganglion cells
Wen-jian Lin, et al.
Volume 10, Issue 10, 2014

The Nobel Prize in Physiology or Medicine 1974
Albert Claude, Christian de Duve, George E. Palade

Share this: 2

Christian de Duve - Facts

Christian de Duve

Born: 2 October 1917, Thames Ditton, United Kingdom

Died: 4 May 2013, Nethen, Belgium

Affiliation at the time of the award: Rockefeller University, New York, NY, USA, Université Catholique de Louvain, Louvain, Belgium

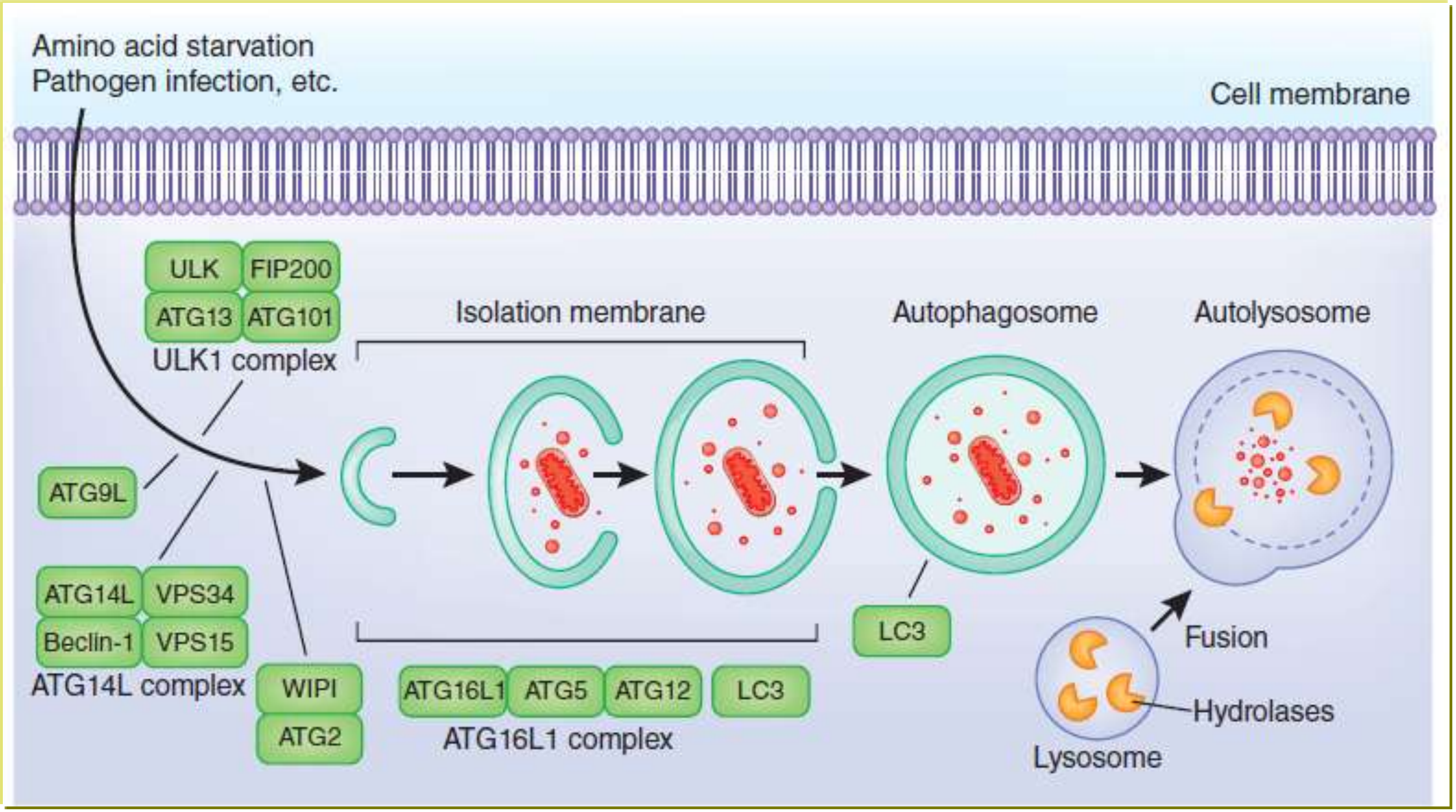
Prize motivation: "for their discoveries concerning the structural and functional organization of the cell"

Field: cell physiology

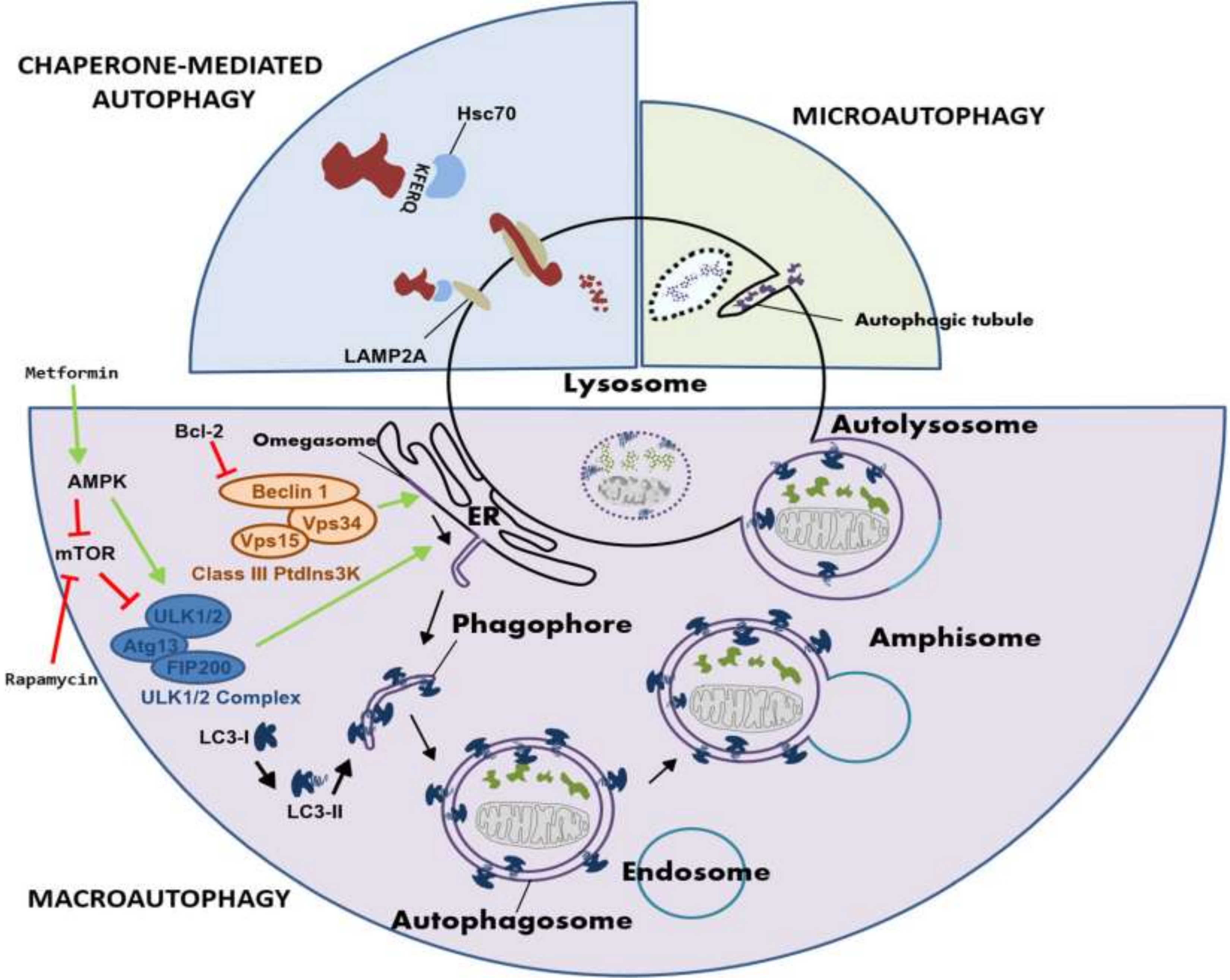
(2 October 1917 – 4 May 2013)

Autophagy Types and Crosstalks

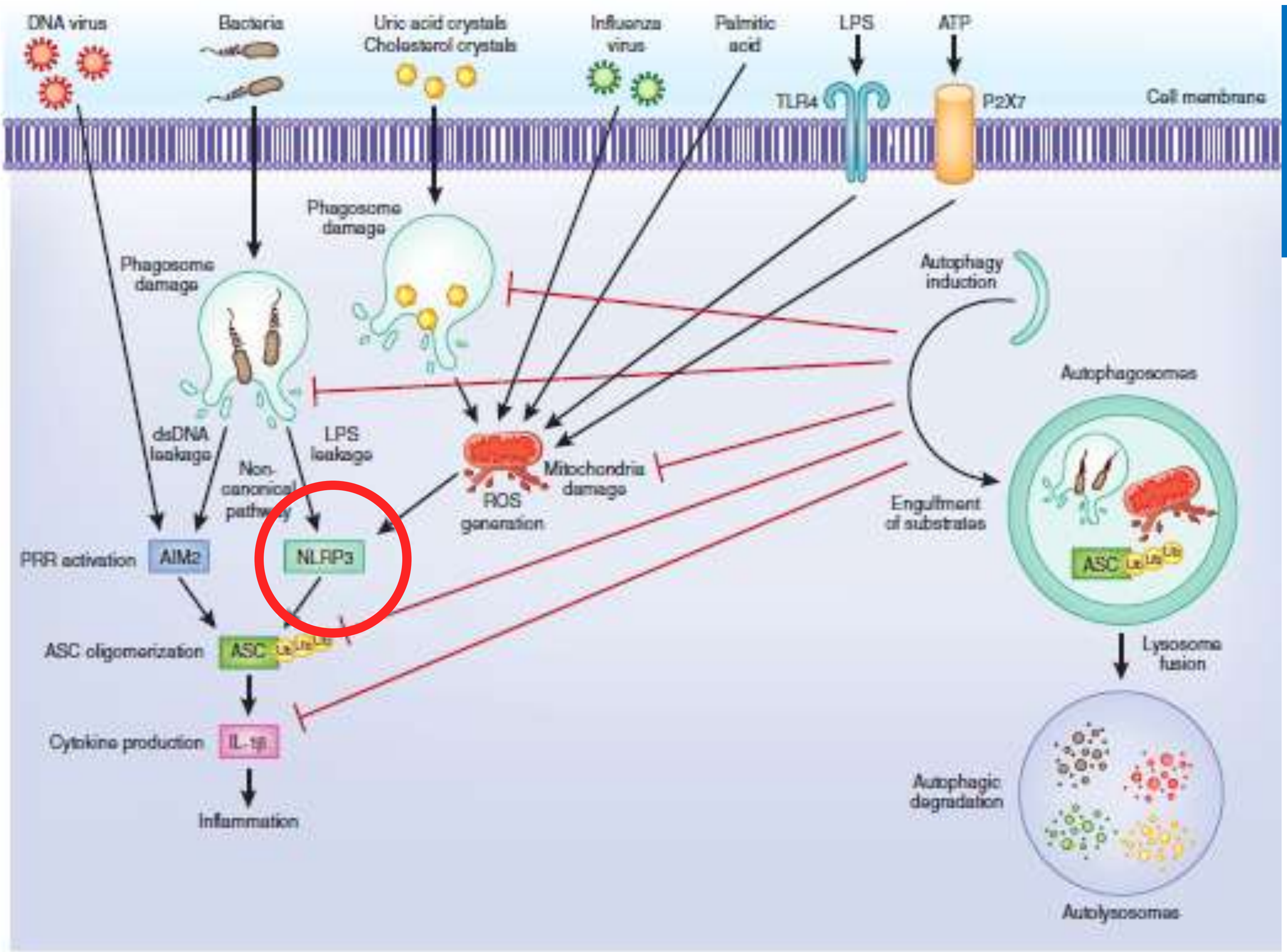
Macroautophagy



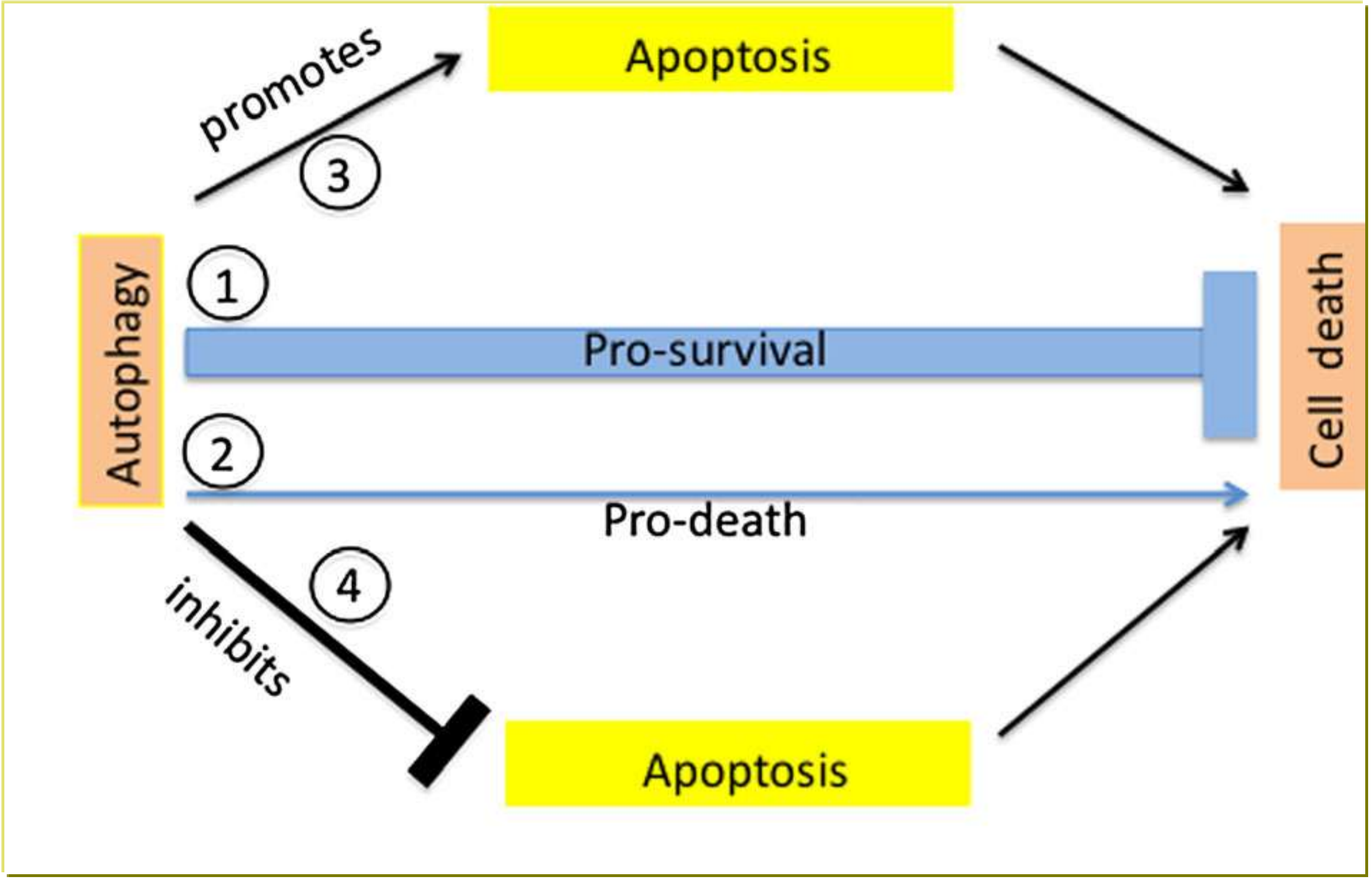
VOLUME 16 NUMBER 10 OCTOBER 2015 **NATURE IMMUNOLOGY**



Pediatr Nephrol 2015, in press


DNA virus
Bacteria
Uric acid crystals
Cholesterol crystals
Influenza virus
Palmitic acid
LPS
ATP
TLR4
P2X7
Cell membrane
Phagosome damage
Phagosome damage
Autophagy induction
Autophagosomes
dsDNA leakage
LPS leakage
Non-canonical pathway
Mitochondria damage
ROS generation
Engulfment of substrates
PRR activation
AIM2
NLRP3
ASC
Ub
ASC oligomerization
Cytokine production
IL-1β
Inflammation
Lysosome fusion
Autophagic degradation
Autolysosomes

Autophagy and Apoptosis: Crosstalk

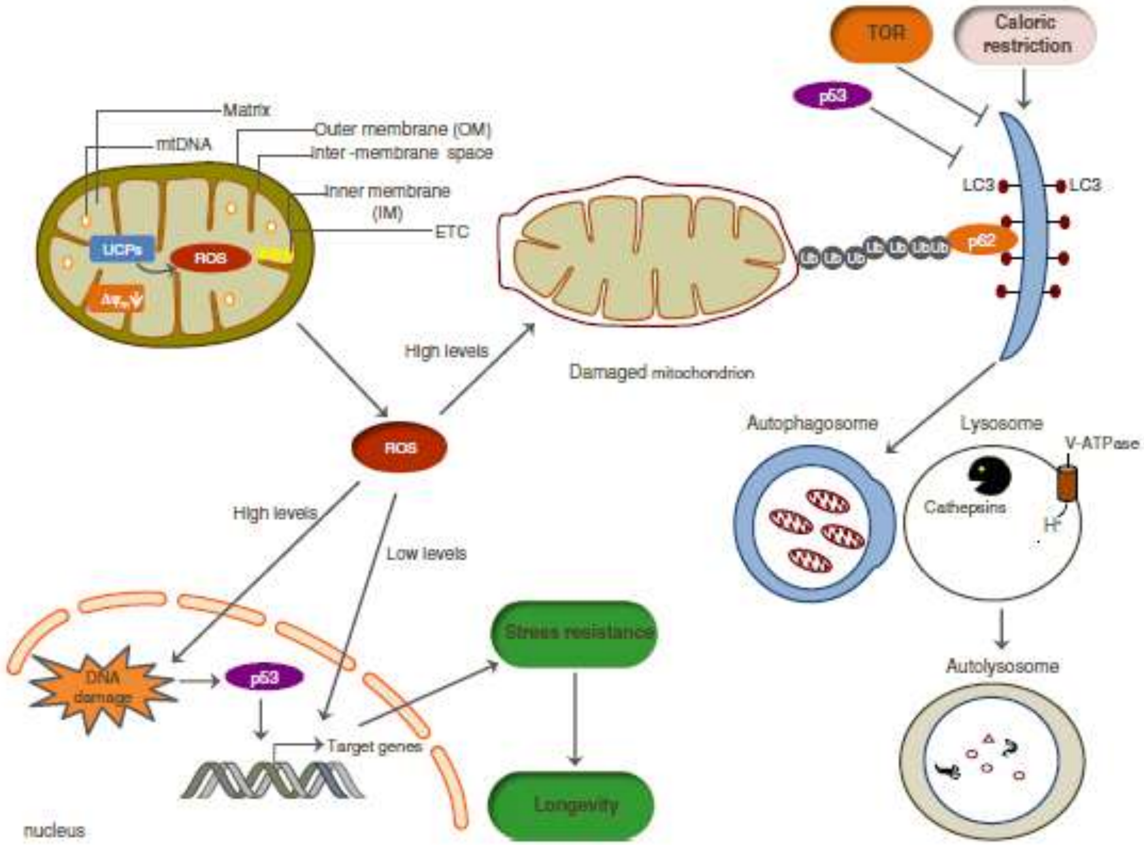


American Journal of Transplantation 2014; 14: 1731–1739

Autophagy and Apoptosis: What Is The Difference?

	Apoptosis ↔	(Macro)autophagy →	Autophagy- dependent cell death
Degradation of	Whole cell	Cellular components	Whole cell
Morphological features	Cell shrinkage Chromatin condensation Plasma membrane blebbing, preserved integrity Nuclear compaction and fragmentation Formation of apoptotic bodies	Autophagosomes Autolysosomes	Minor changes to chromatine Plasma membrane rupture Minor changes to nucleus Autophagosomes Autolysosomes
Interacting molecules	Bcl-2 ⊣ Bcl-2 + BH3 mimetics —x⊣ Caspases ⊣ Bcl-2 ⊢ Bcl-XL ←	Beclin 1/ Class III PtdIns3K interaction Beclin 1/ Class III PtdIns3K interaction Atg proteins Beclin 1 Unconjugated Atg12 Atg12 – Atg3 complex	
Key molecules / regulators	TNF superfamily members Caspase proteases Bcl-2 proteins	Atg proteins Beclin 1 / Class III PtdIns3K ULK1/2 mTOR LC3	

Pediatr Nephrol 2015, in press



Biochimica et Biophysica Acta 1847 (2015) 1412–1423

Accepted Manuscript

Autophagic response to cell culture stress in pluripotent stem cells

Sian Gregory, Sushma Swamy, Zoe Hewitt, Andrew Wood, Richard Weightman, Harry Moore

PII: S0006-291X(15)30597-0

DOI: 10.1016/j.bbrc.2015.09.080

Reference: YBBRC 34580

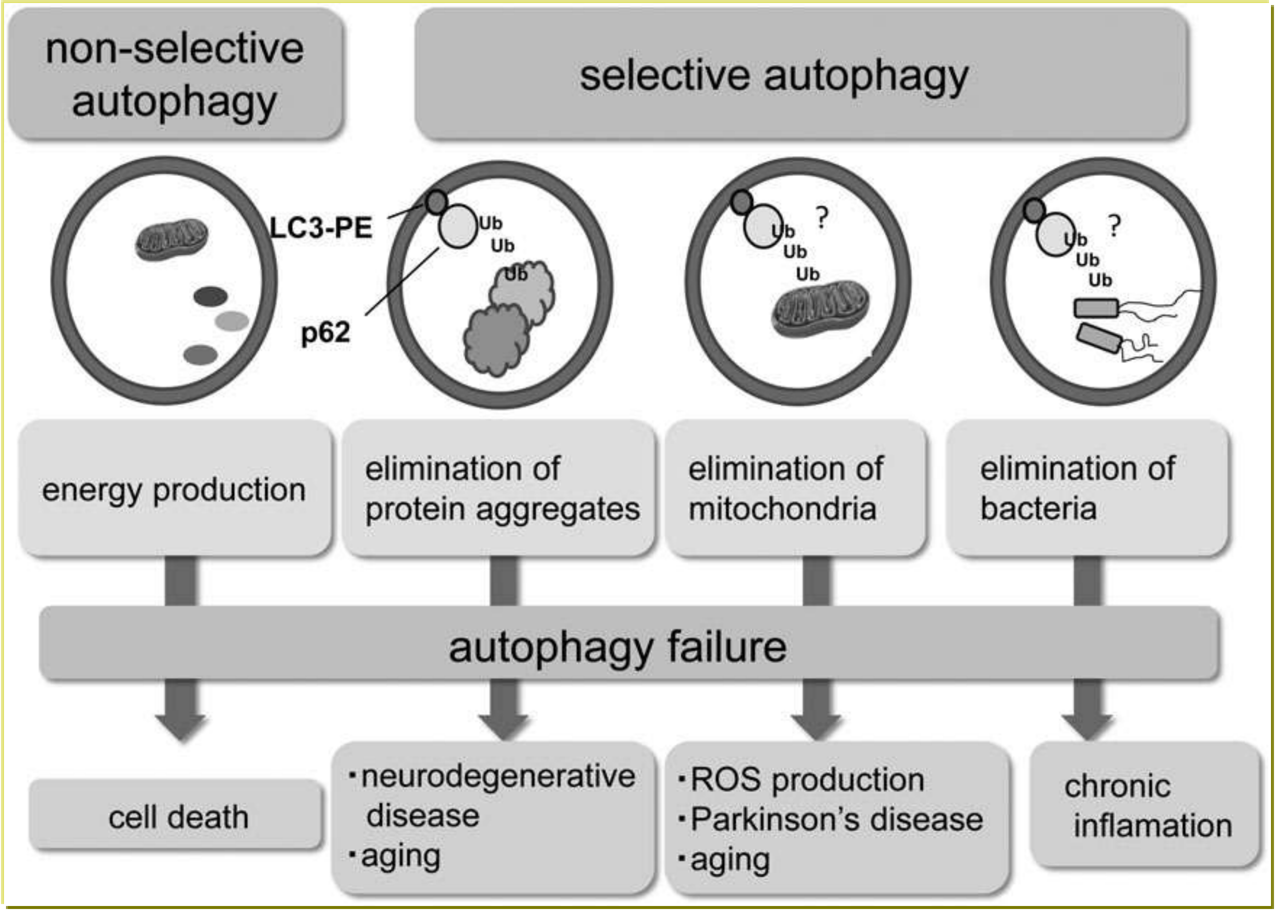
To appear in: *Biochemical and Biophysical Research Communications*

Received Date: 12 August 2015

Accepted Date: 13 September 2015

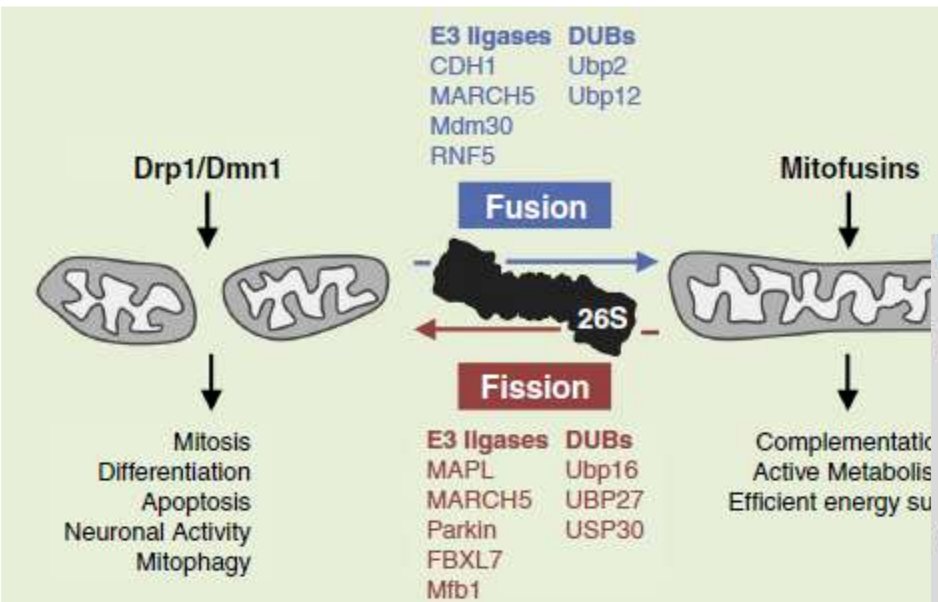
Autophagy Dysfunction and Consequences

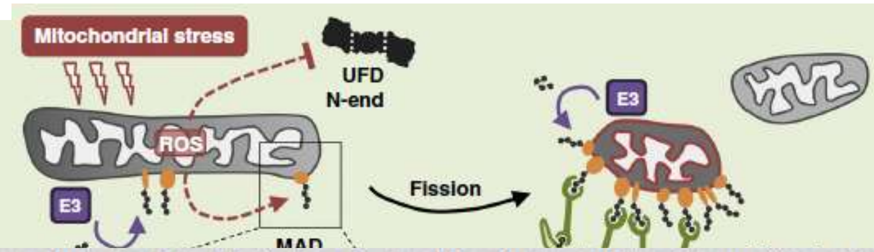
Autophagy Dysfunction: Consequences



Nephrol Dial Transplant (2014) 29: 1639–1647

Mitophagy Dysfunction: Consequences

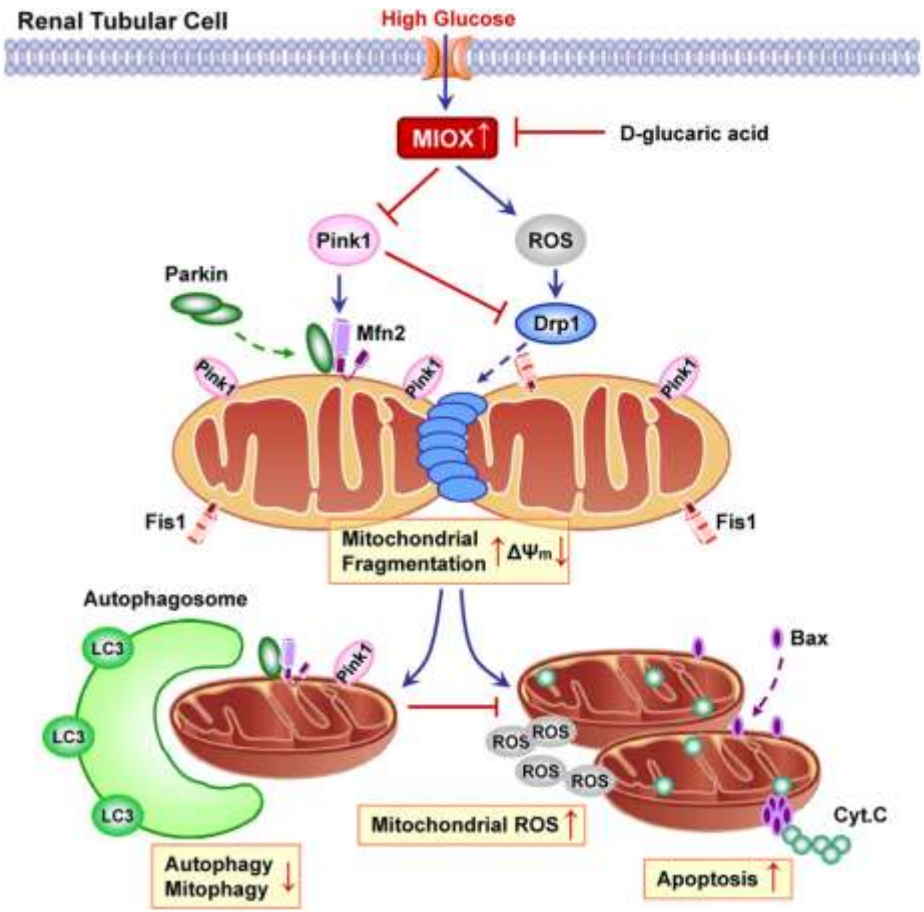




Human pathologies linked to factors involved in mitochondrial protein quality control

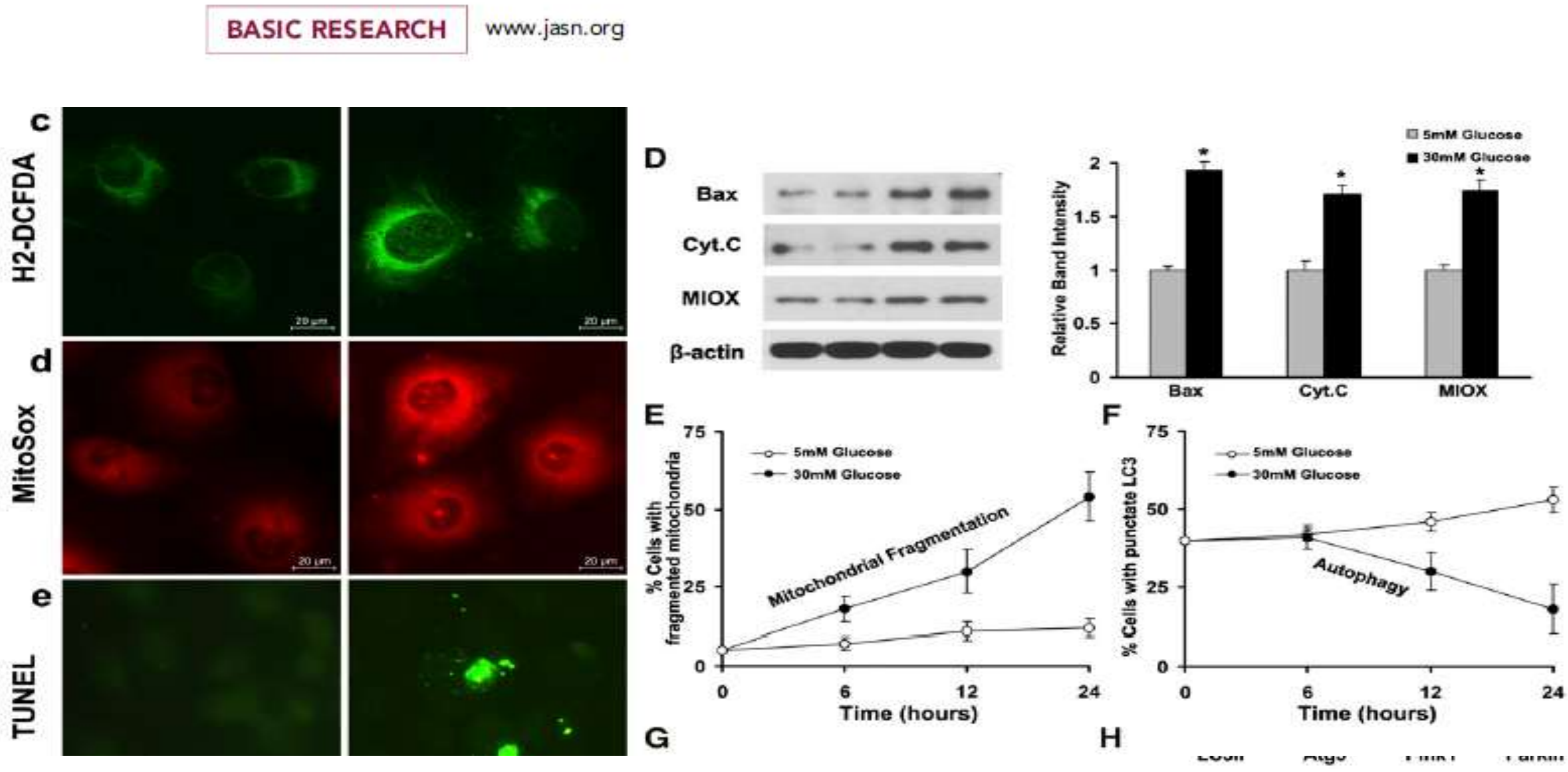
	Disease
UPS	
Parkin	Parkinson's disease (PD)
Huwe1/Mule	Nonsyndromic intellectual disability (ID)
Cdc48/p97	Amyotrophic lateral sclerosis (ALS); inclusion body myopathy with early-onset Paget disease and frontotemporal dementia (IBMPFD)
Fission–fusion	
OPA1	Autosomal Dominant Optic Atrophy 1 (ADOA)
Mfn2	Charcot–Marie–Tooth syndrome type 2A (CMT2A)
OPA3	3-Methylglutaconic aciduria 3 (MGA3 or Costeff optic atrophy syndrome); Optic atrophy 3 (OPA3)
DRP1	Lethal encephalopathy due to mitochondrial and peroxisomal fission defect
GDAP1	Charcot–Marie–Tooth syndrome type 4A (CMT4A); Charcot–Marie–Tooth syndrome type 2K CMT2K
Mitophagy	
Parkin	Parkinson's disease (PD)
PINK1	Parkinson's disease (PD)
UBE2A	X-linked intellectual disability (XLID)
USP8	Cushing's disease
LAMP2	Danon disease
p62	Paget disease of bone (PDB)
Optineurin	Amyotrophic lateral sclerosis (ALS); primary open-angle

MIOX Pathway



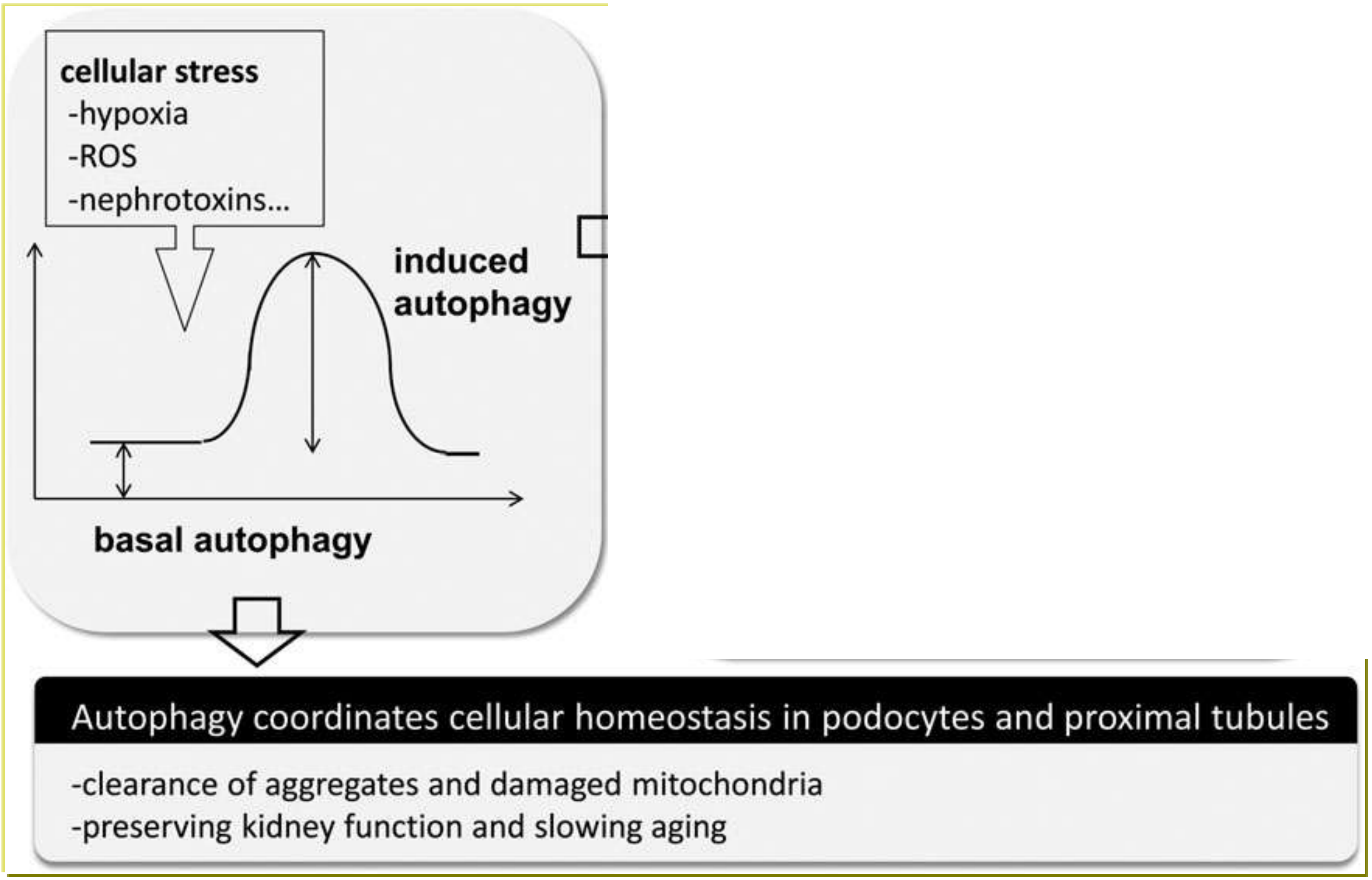
J AmSoc Nephrol 26: 1304–1321, 2015

Mitophagy Dysfunction: MIOX Pathway



J AmSoc Nephrol 26: 1304–1321, 2015

Autophagy Dysfunction: Kidney Diseases



Nephrol Dial Transplant (2014) 29: 1639–1647

Urology and Nephrology Center

BASIC RESEARCH www.jasn.org

Deficient Autophagy Results in Mitochondrial Dysfunction and FSGS

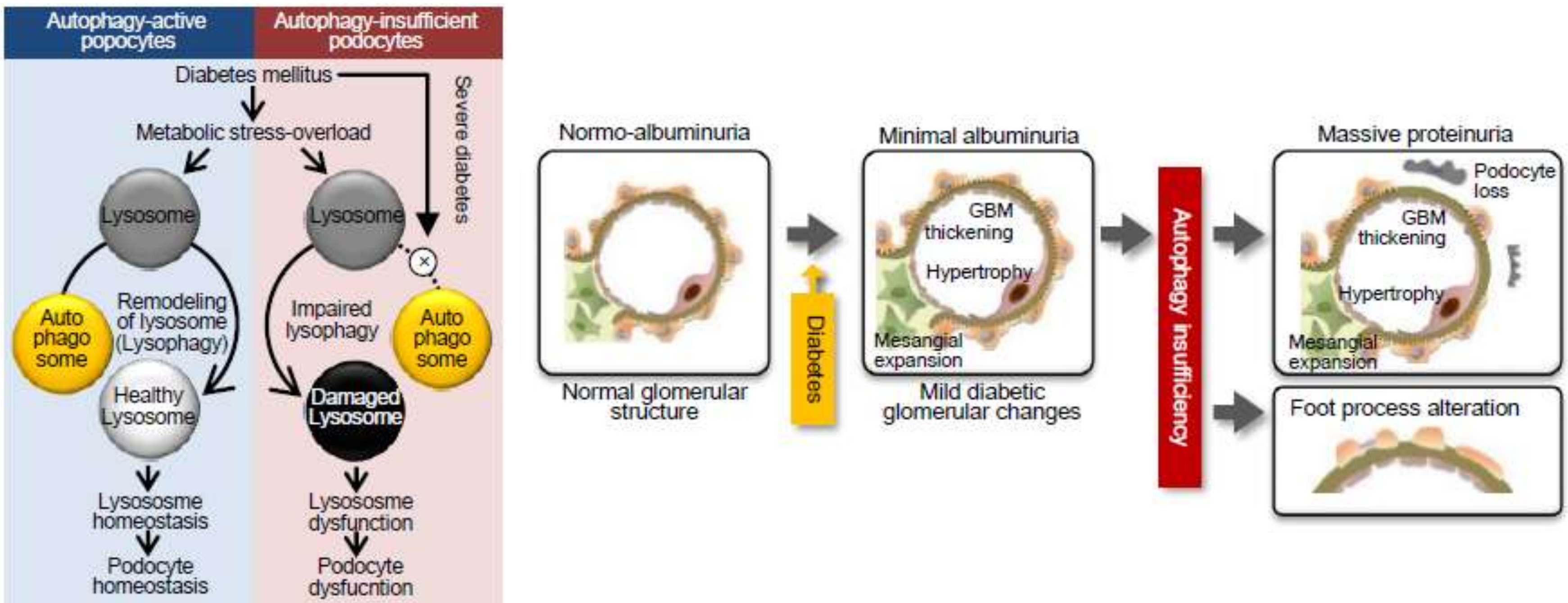
Takahisa Kawakami,[*,†,‡] Ivan G. Gomez,[*,†,‡] Shuyu Ren,[*,†,§] Kelly Hudkins,[*] Allie Roach,[*,†,§] Charles E. Alpers,[*] Stuart J. Shankland,[*] Vivette D. D'Agati,[‖] and Jeremy S. Duffield[*,†,§]

[*]Division of Nephrology, Departments of Medicine & Pathology, and [†]Institute for Stem Cell & Regenerative Medicine, University of Washington, Seattle, Washington; [‡]Division of Nephrology and Endocrinology, The University of Tokyo, Tokyo, Japan; [§]Biogen Idec, Inc., Cambridge, Massachusetts; and [‖]Department of Pathology, Columbia University, New York, New York

J Am Soc Nephrol 26: 1040–1052, 2015

Autophagy Dysfunction: Podocytopathy in DN

Impaired podocyte autophagy exacerbates proteinuria in diabetic nephropathy



Diabetes 2015, Accepted

TRANSLATIONAL RESEARCH PAPER

Autophagy 11:7, 1130–1145; July 2015; © 2015 Taylor & Francis Group, LLC

Endothelial cell and podocyte autophagy synergistically protect from diabetes-induced glomerulosclerosis

Olivia Lenoir,[1,2] Magali Jasiek,[1,2] Carole Hénique,[1,2] Léa Guyonnet,[1,2] Björn Hartleben,[3] Tillmann Bork,[3] Anna Chipont,[1,2] Kathleen Flosseau,[1,2] Imane Bensaada,[1,2] Alain Schmitt,[2,4,5] Jean-Marc Massé,[2,4,5] Michèle Souyri,[6] Tobias B Huber,[3,7] and Pierre-Louis Tharaux[1,2,8,*]

[1]Paris Cardiovascular Research Center; Institut National de la Santé et de la Recherche Médicale (INSERM); Paris, France; [2]Université Paris Descartes; Sorbonne Paris Cité; Paris, France; [3]Renal Division; University Hospital Freiburg; Freiburg, Germany; [4]CNRS UMR8104; Paris, France; [5]Plateforme de Microscopie Electronique; INSERM U1016; Institut Cochin; Paris, France; [6]CNRS; UMR7622; Paris, France; [7]BIOSS Center for Biological Signaling Studies; Albert-Ludwigs-University; Freiburg, Germany; [8]Nephrology Service; Georges Pompidou European Hospital; Assistance Publique-Hôpitaux de Paris; Paris, France

Autophagy 11:7, 1130--1145; July 2015;

ANCA Associated Vascuilitis

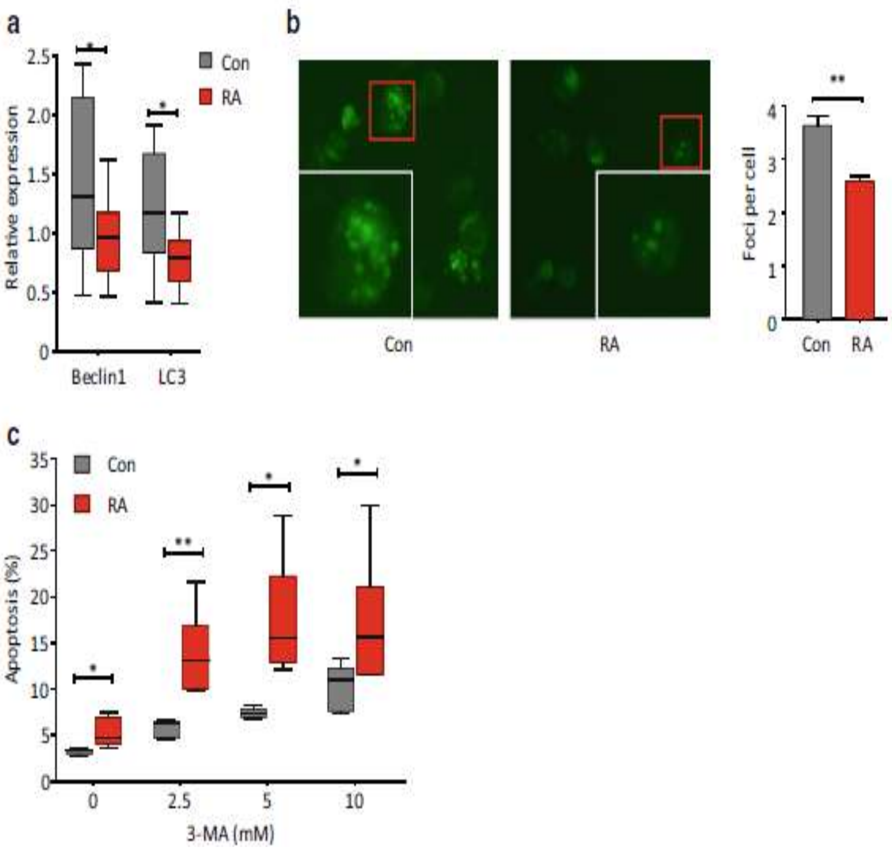
Clinical & Experimental Immunology
The Journal of Translational Immunology

Clinical and Experimental Immunology ORIGINAL ARTICLE doi:10.1111/cei.12589

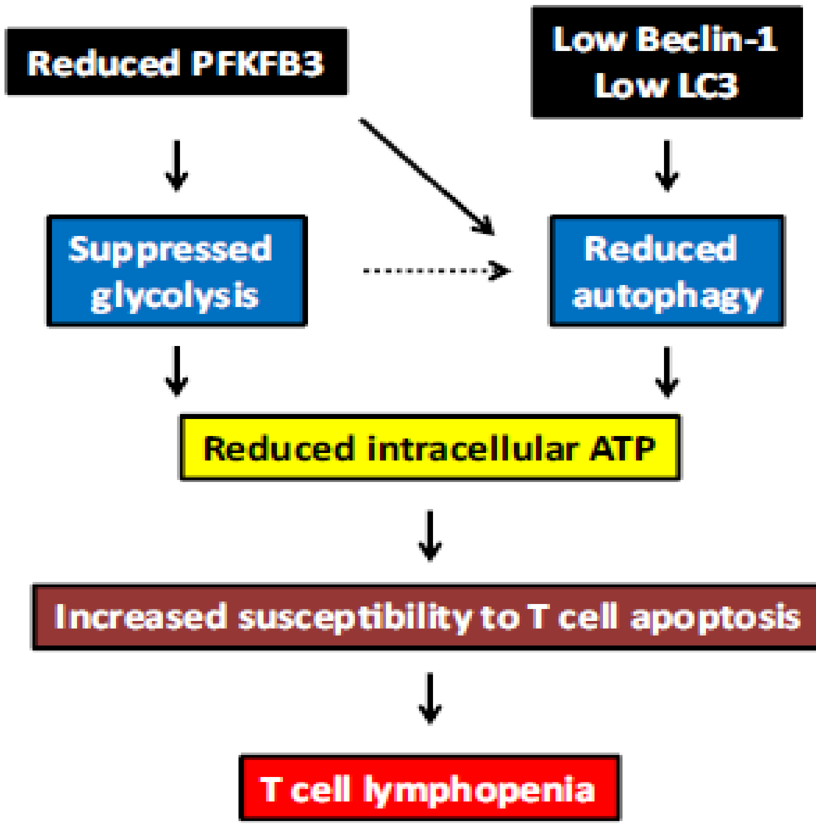
Neutrophil extracellular trap formation is associated with autophagy-related signalling in ANCA-associated vasculitis

Clinical and Experimental Immunology 2015, 180: 408–418

Autophagy Dysfunction:
Autoimmune Disease



Rheumatoid Arthritis

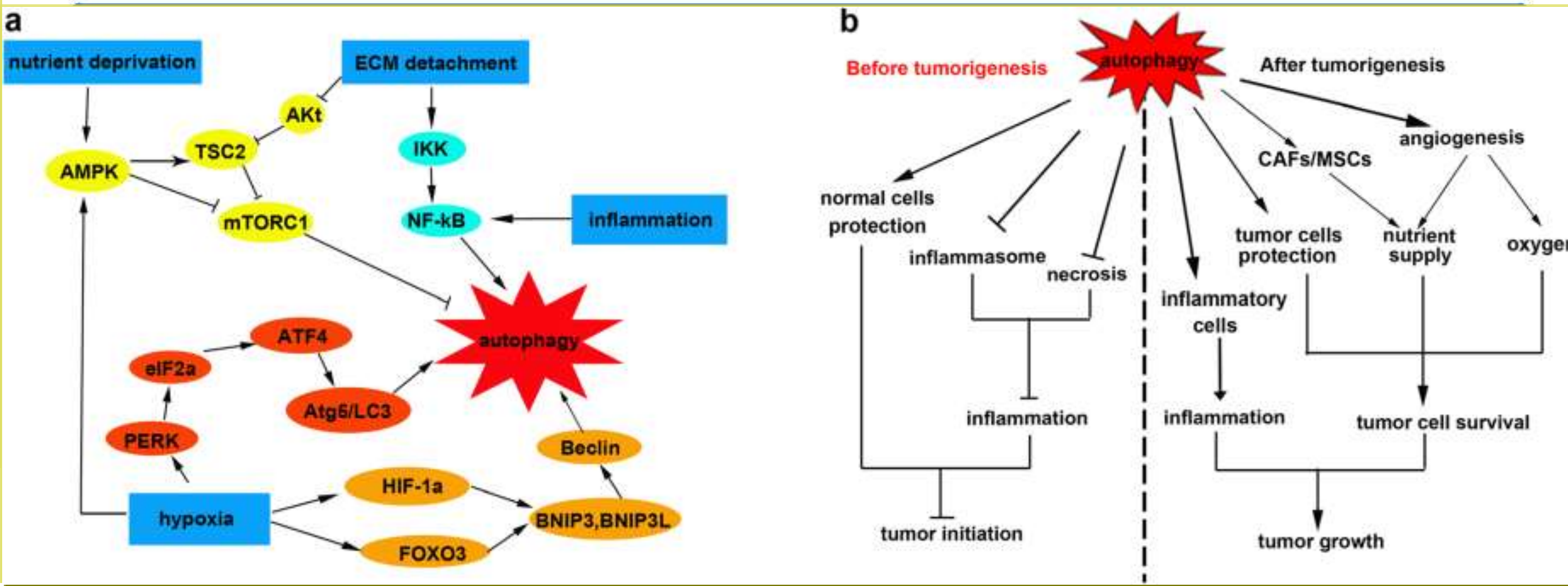


J Mol Med (2015) 93:707–717

Autophagy Dysfunction: Oncogenesis

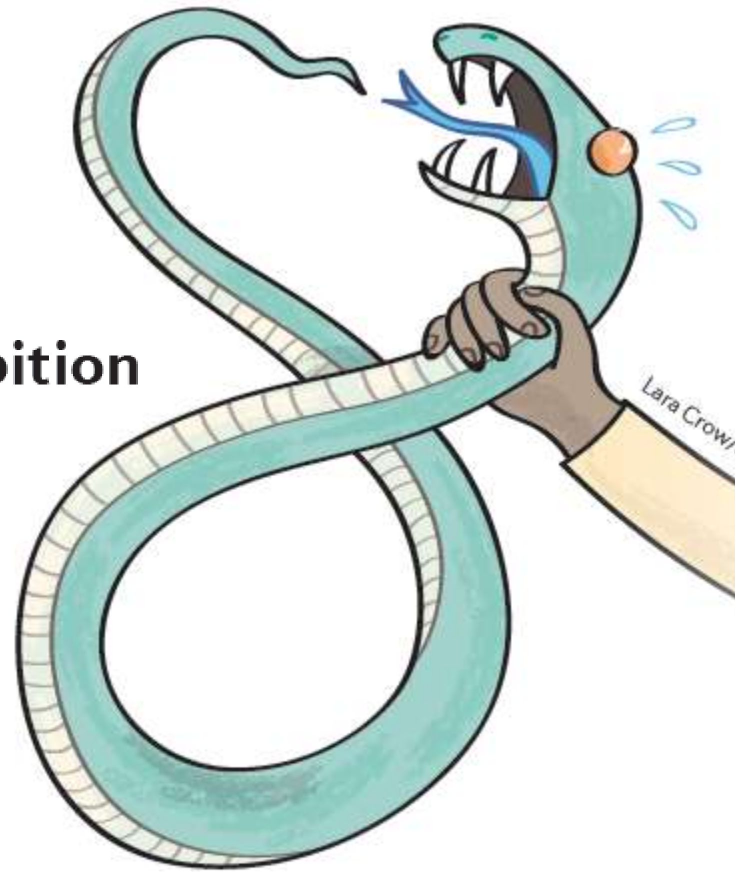
Yang *et al. Cell & Bioscience* (2015) 5:14
DOI 10.1186/s13578-015-0005-2

Cell & Bioscience



Yang et al. Cell & Bioscience (2015) 5:14

Exploring the anticancer effects of autophagy inhibition

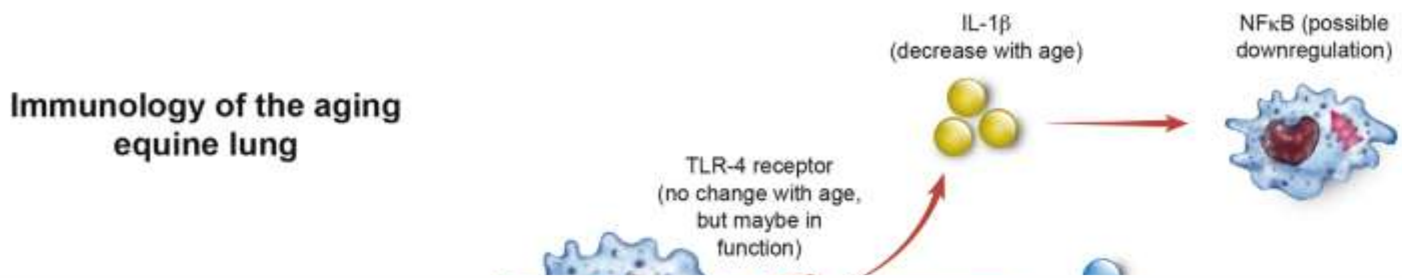


“these results indicate that the inhibition of autophagy in the intestinal epithelium may suppress the development and progression of tumours”

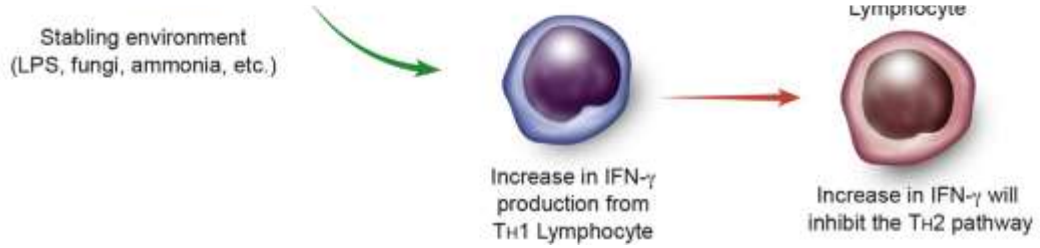
ORIGINAL RESEARCH PAPER Lévy, J. *et al.* Intestinal inhibition of *Atg7* prevents tumour initiation through a microbiome-influenced immune response and suppresses tumour growth. *Nat. Cell Biol.* **17**, 1062–1073 (2015)

Autophagy, Immunity and Immunosenescence

Immunosenescence



Cell type	Peripheral blood (human)	Airspace of the lung (human)
Alveolar macrophage	—	↓
Neutrophils	—	↑
Total lymphocytes	—	↑
CD4+ T-cells	↓	
CD8+ T-cells	↓	
CD4+/CD8+ ratio	↓	↑
B-cells	↓	-



Ageing Research Reviews 20 (2015) 11–23

Autophagy Defect: Macrophage Aging

Research Article

Journal of Innate Immunity

J Innate Immun 2015;7:375–391
DOI: 10.1159/000370112

Received: June 13, 2014
Accepted after revision: November 25, 2014
Published online: March 10, 2015

Autophagy Controls Acquisition of Aging Features in Macrophages

Amanda J. Stranks[a] Anne Louise Hansen[b] Isabel Panse[a]
Monika Mortensen[e] David J.P. Ferguson[c] Daniel J. Puleston[a]
Kevin Shenderov[f] Alexander Scarth Watson[a] Marc Veldhoen[d]
Kanchan Phadwal[b] Vincenzo Cerundolo[a] Anna Katharina Simon[a, b]

[a]MRC Human Immunology Unit, Weatherall Institute of Molecular Medicine, University of Oxford, [b]BRC Translational Immunology Lab, Experimental Medicine, Nuffield Department of Medicine, and [c]Nuffield Department of Clinical and Laboratory Sciences, John Radcliffe Hospital, Oxford, [d]Babraham Institute, Cambridge, UK; [e]Cell Death and Metabolism, Danish Cancer Society Research Center, Danish Cancer Society, Copenhagen, Denmark; [f]Johns Hopkins University School of Medicine, Baltimore, Md., USA

J Innate Immun 2015;7:375–391

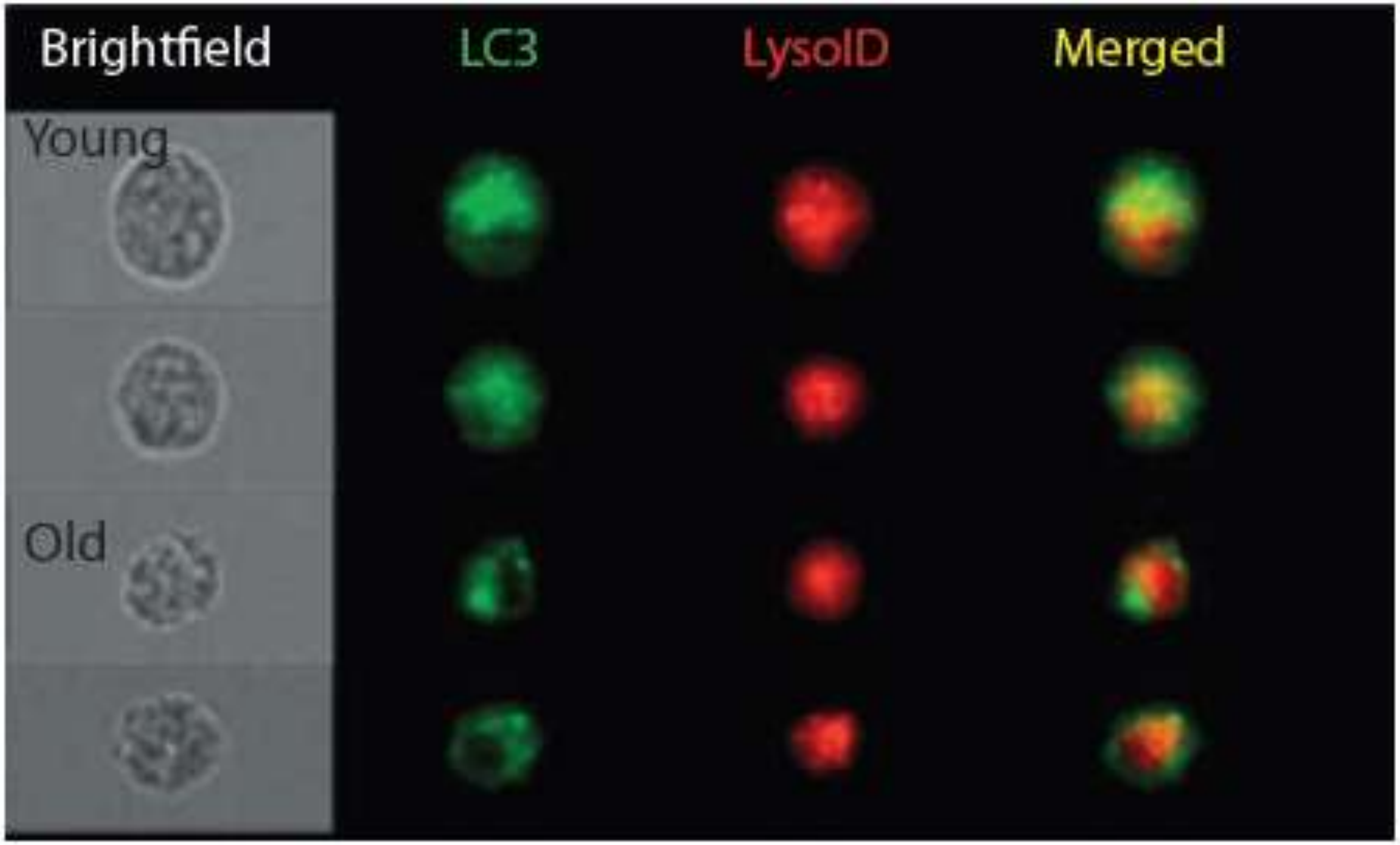
Autophagy Defect:
Macrophage Aging

Summary of similarities between aged and Atg7$^{-/-}$-deficient macrophages

Aged macrophages	Macrophage phenotype	Atg7$^{-/-}$ macrophages
✓ (not in peritoneum)	Relatively increased numbers of macrophages, monocytes	✓
✓ (after LPS stimulation)	Increased mitochondria and mROS	✓
✓	Decreased phagocytosis	✓ (phagocytosis of beads)
✓	Decreased NO	✓
✓	Reduced surface marker expression	✓
✓	Reduced antigen presentation (DC)	✓
✓	Increased inflammatory cytokine production	✓
✓	Metabolism alterations	✓

J Innate Immun 2015;7:375–391

Autophagy Defect: Macrophage Aging



J Innate Immun 2015;7:375–391

Autophagy Defect: Macrophage Aging

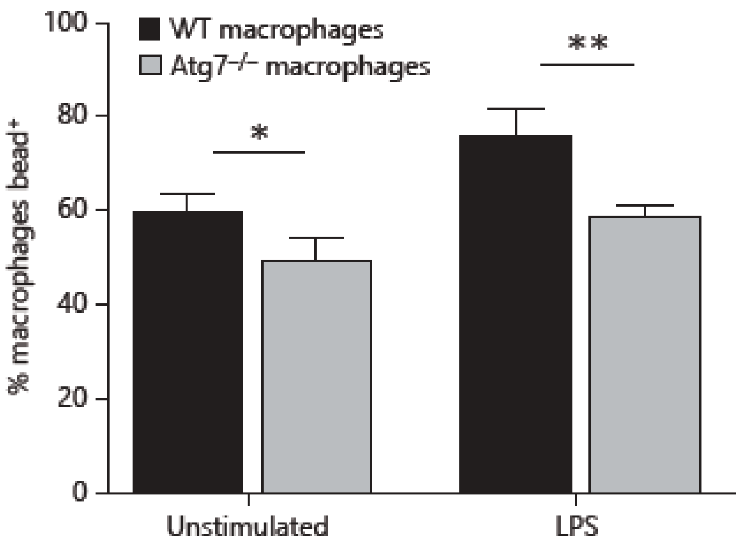
Summary of surface marker expression on autophagy-deficient macrophages relative to WT

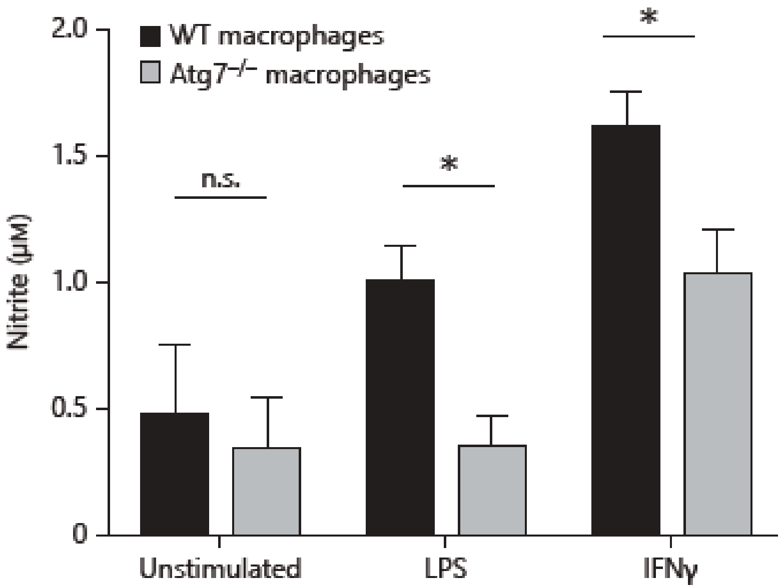
Marker	Atg7$^{-/-}$
F4/80	±/●
CD11b	●
MHC I	↓
MHC II	↓
CD47	↓
CD48	↓
TLR4	↓
CD86	↓
Mannose receptor	↓
CD13	±
CD14	↓
M-CSFR	↓

The expression of each marker [decreased (↓), similar (●) or variable (±)] was determined by the geometric mean of fluorescence relative to WT macrophages.

J Innate Immun 2015;7:375–391

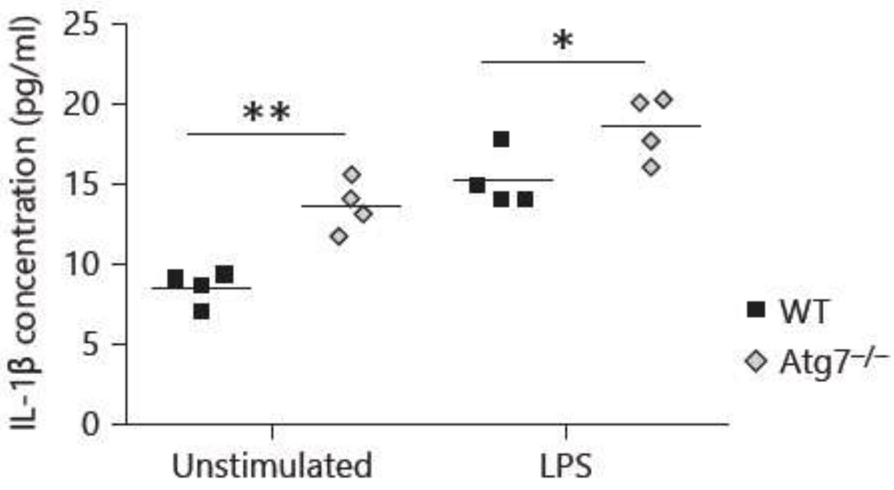
Autophagy Defect: Macrophage Aging

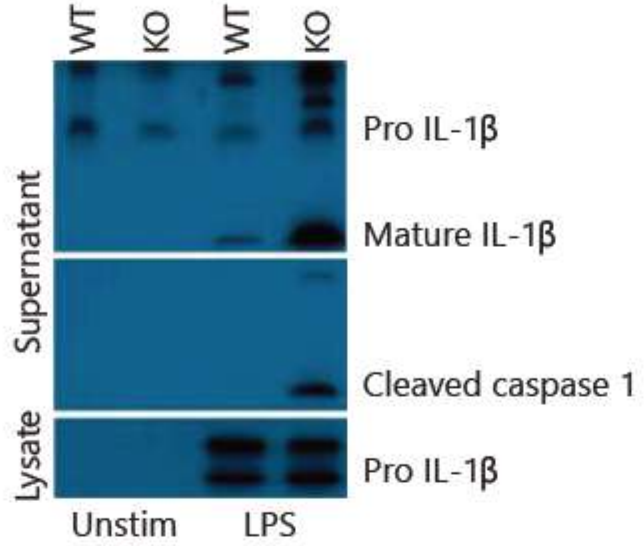




J Innate Immun 2015;7:375–391

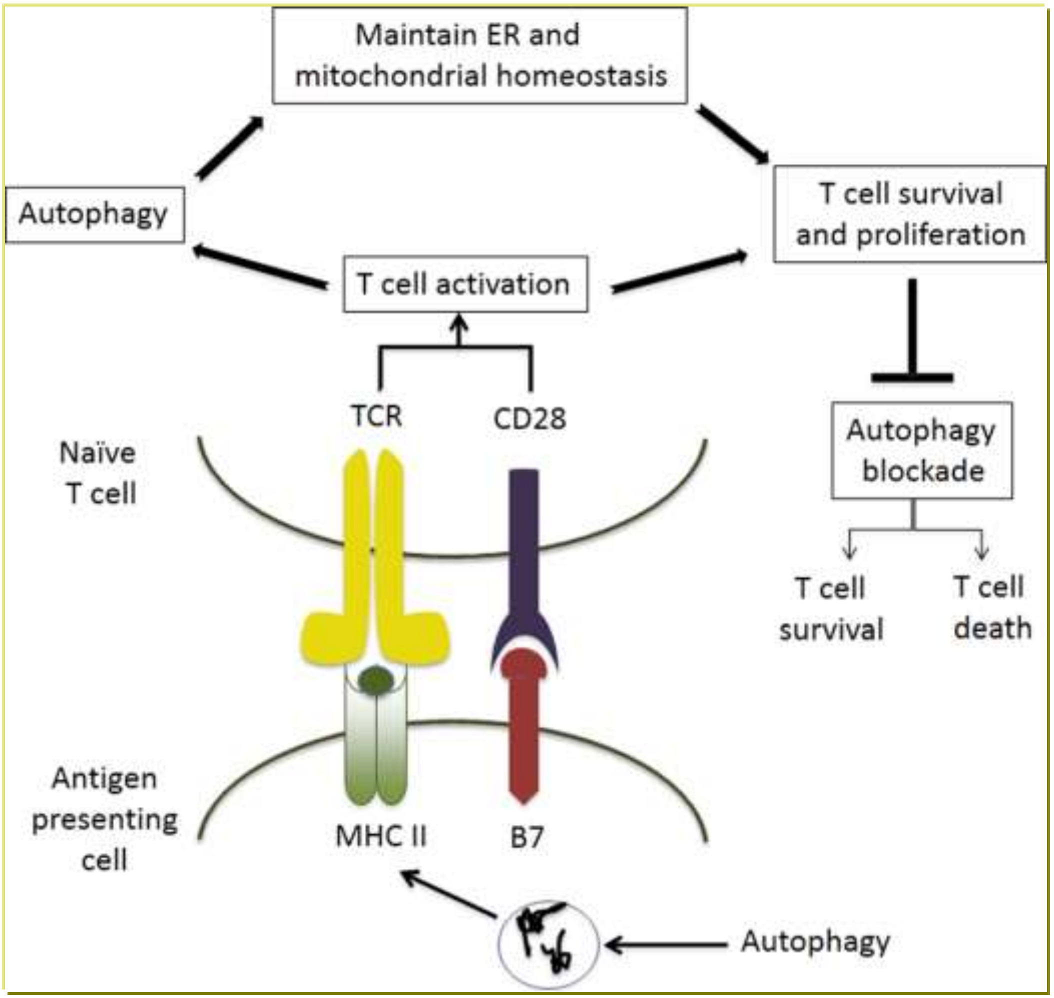
Autophagy Defect: Macrophage Aging



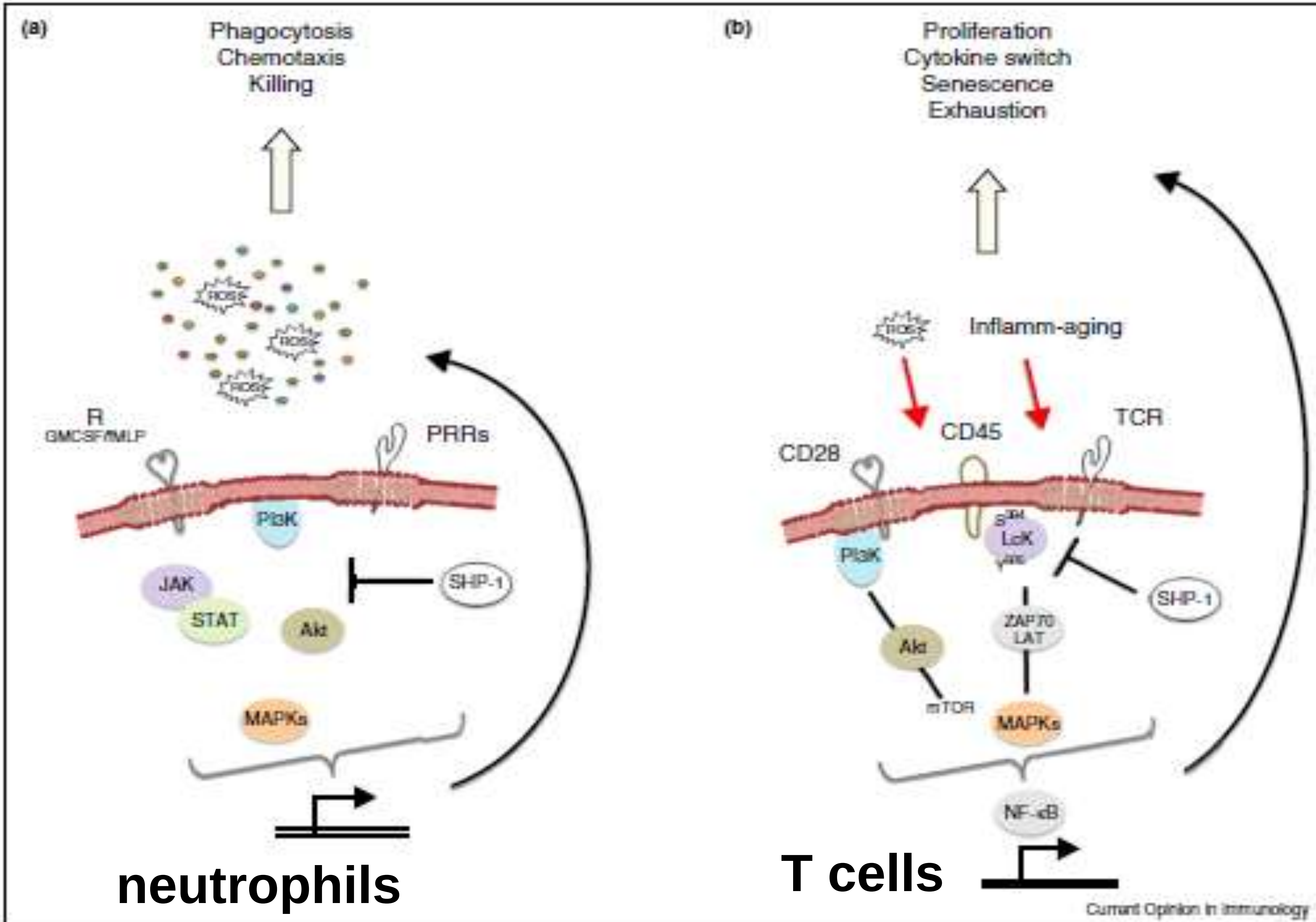


J Innate Immun 2015;7:375–391

Autophagy Effects:
T Cell



American Journal of Transplantation 2014; 14: 1731–1739



Current Opinion in Immunology 2014, 29:105–111

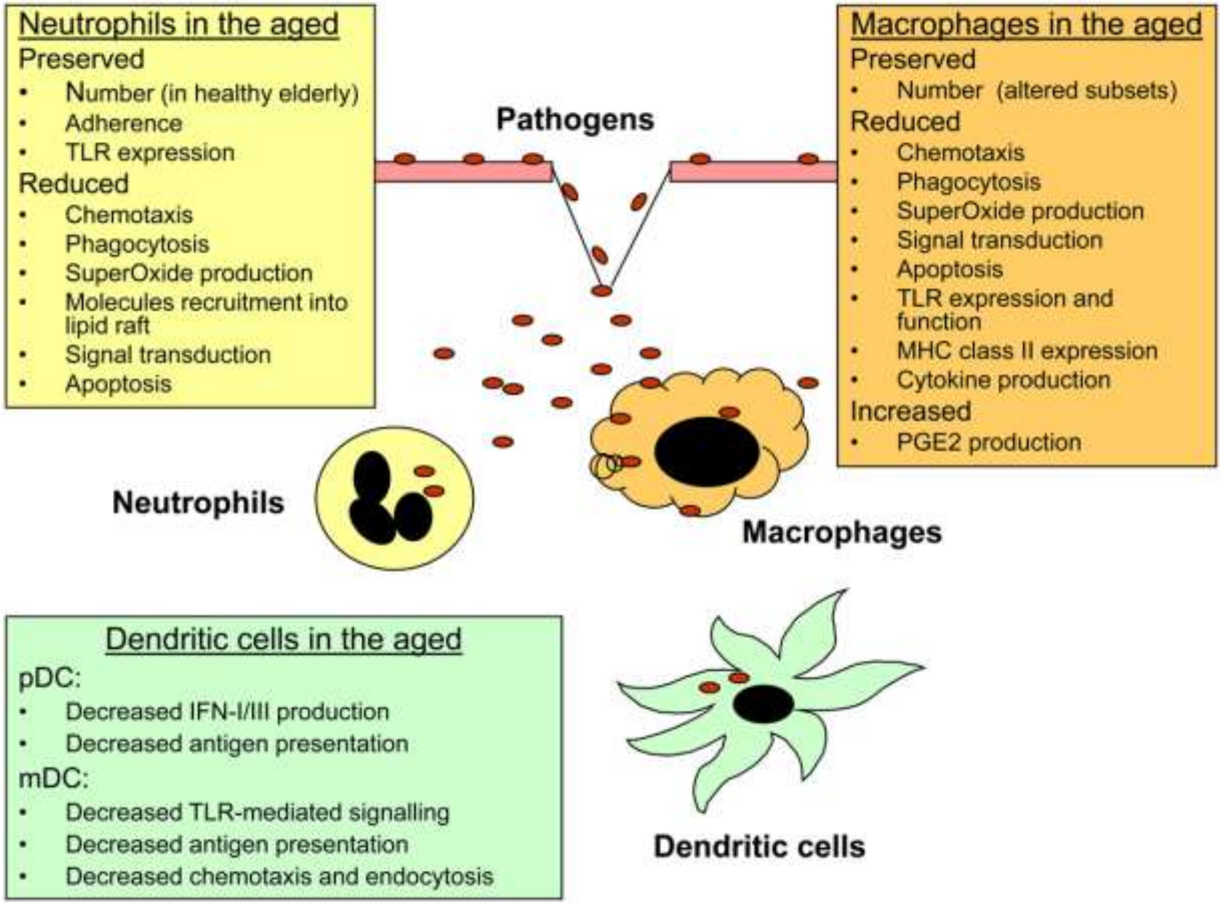
Autophagy Upregulation: B Cell

Clinical & Experimental Immunology
The Journal of Translational Immunology
British Society for immunology
Clinical and Experimental Immunology ORIGINAL ARTICLE doi:10.1111/cei.12658

***TRAF3IP3*, a novel autophagy up-regulated gene, is involved in marginal zone B lymphocyte development and survival**

Clinical and Experimental Immunology 2015, 182: 57–68

Immunosenescence: At A Glance



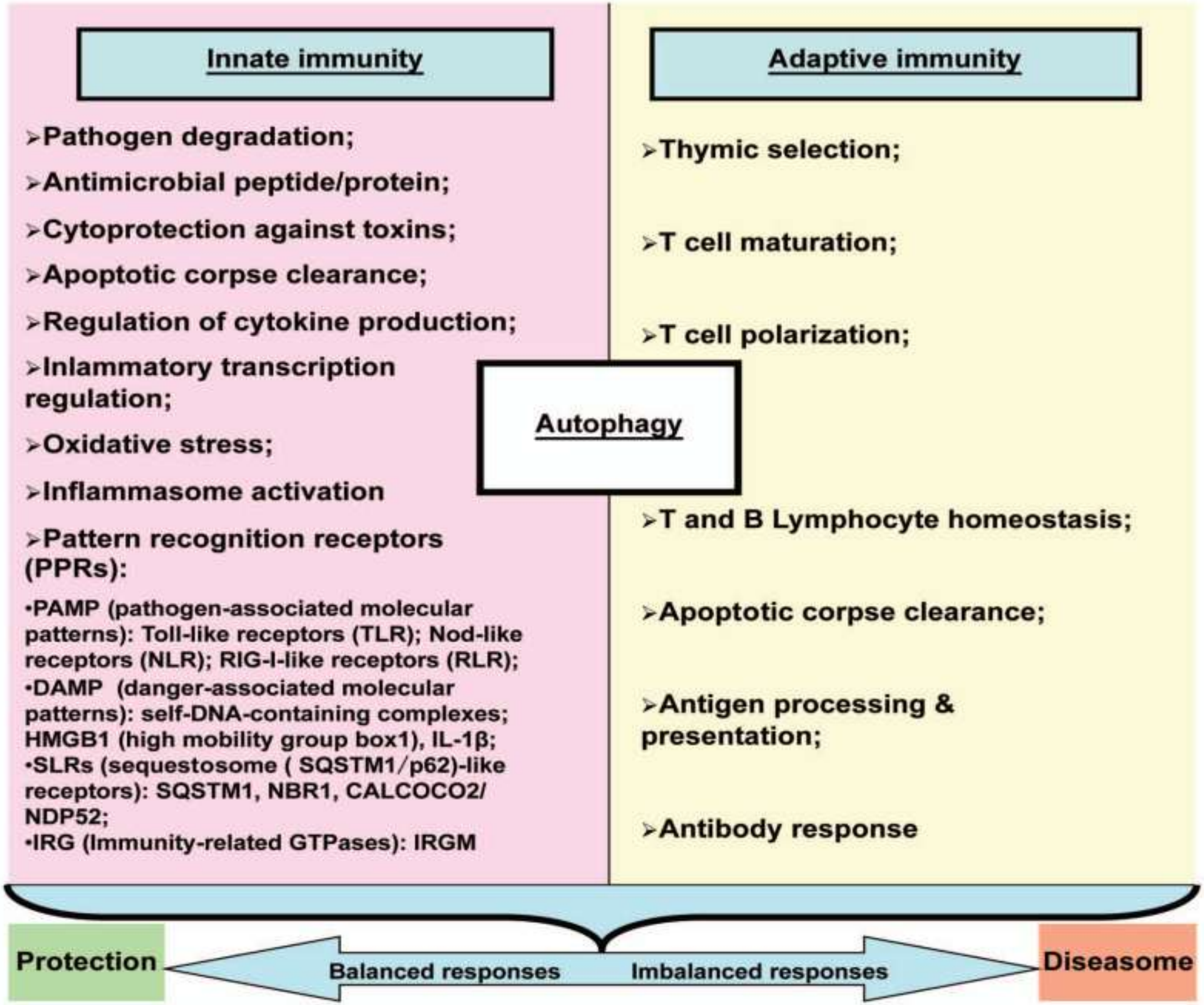
Seminars in Immunology *24 (2012) 331– 341*

Immune Functions of Autophagy

Immune functions of autophagy

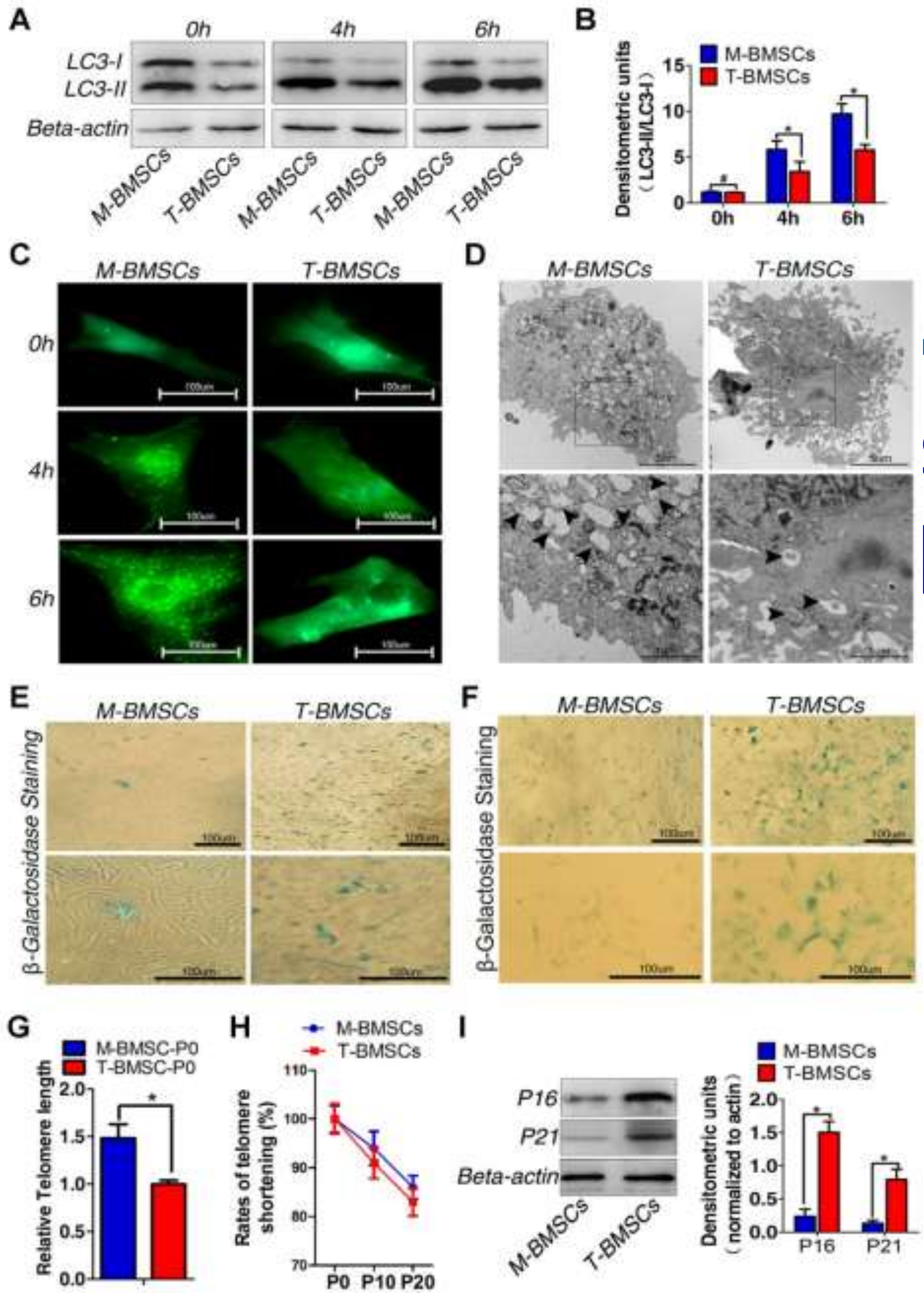
Innate immunity	Adaptive immunity
Regulation of inflammatory cytokine production	Thymic selection
Regulation of type I interferon production	Antigen presentation
Regulation of inflammatory transcriptional response	Apoptotic bodies clearance
Apoptotic bodies clearance	Lymphocytes homeostasis
Pathogen degradation	–
Phagosome maturation	–

American Journal of Transplantation 2014; 14: 13–20



Autophagy 8:9, 1286-1299; September 2012;

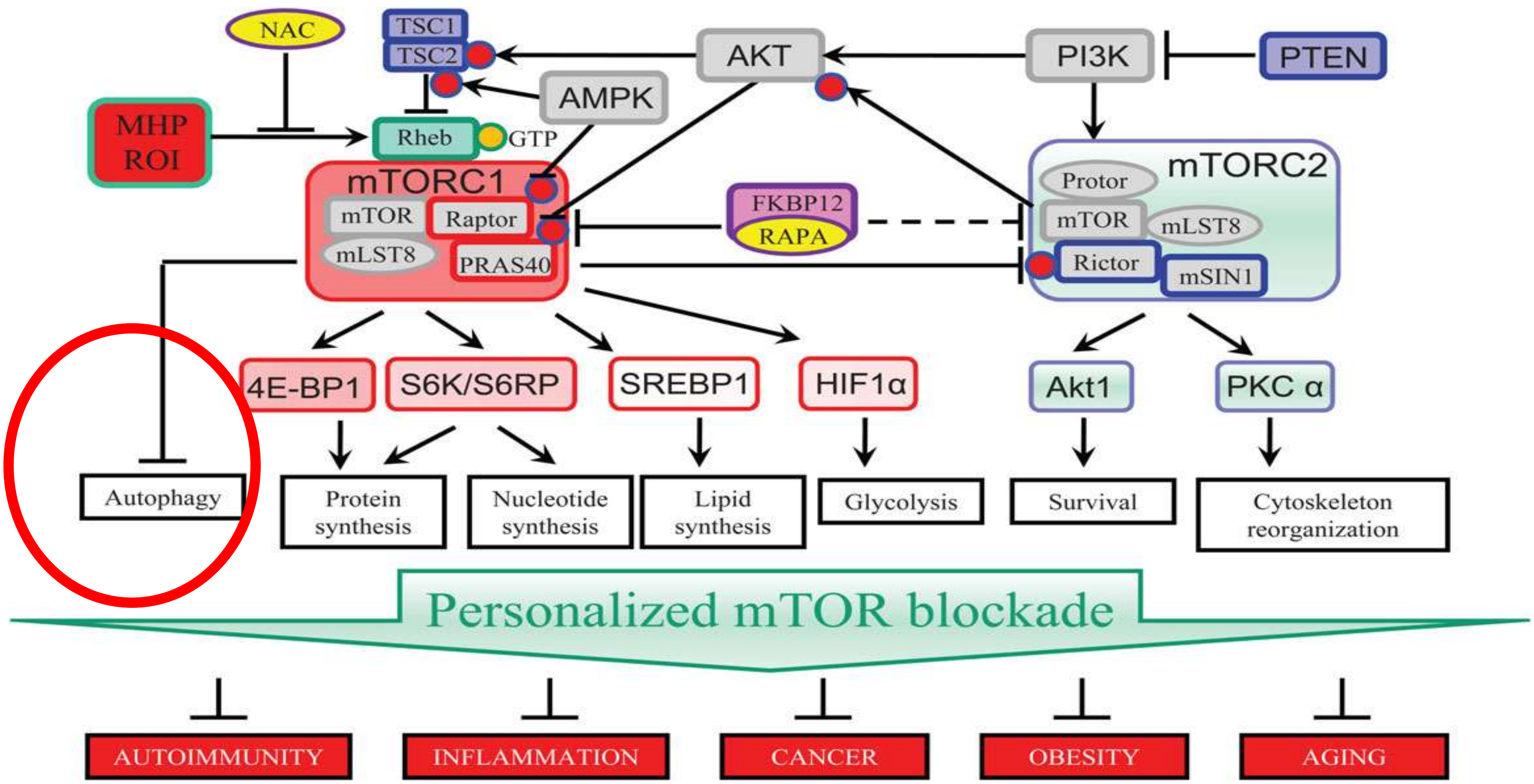
Auto scence capabili l T-BMSCs



J. Cell. Physiol. 230: 680–690, 2015

Autophagy and mTOR

mTOR In Focus



Ann. N.Y. Acad. Sci. 1346 (2015) 33–44 C 2015 New York Academy of Sciences.

mTOR In Focus

Pharmacological blockade of mTOR pathway activation

Drug	Molecular target	Mechanism of action	Pathway blockade
Rapamycin	FKBP12	Allosteric	mTORC1
Everolimus	FKBP12	Allosteric	mTORC1
Temsirolimus	FKBP12	Allosteric	mTORC1
Torin1	mTOR kinase domain	ATP competitive	mTORC1/mTORC2
AZD8055	mTOR kinase domain	ATP competitive	mTORC1/mTORC2
INK128	mTOR kinase domain	ATP competitive	mTORC1/mTORC2
BGT226	PI3K/mTOR kinase	ATP competitive	PI3K/mTORC1/mTORC2
BAL	Disulfide bonds	H donor	Raptor/mTORC1
NAC	GSH	Antioxidant	mTORC1
Metformin	ETC complex I	Antioxidant	mTORC1

Ann. N.Y. Acad. Sci. 1346 (2015) 33–44 C 2015 New York Academy of Sciences.

Urology and Nephrology Center

CLINICAL RESEARCH PAPER

Autophagy 10:8, 1391–1402; August 2014; © 2014 Landes Bioscience

Combined MTOR and autophagy inhibition

Phase I trial of hydroxychloroquine and temsirolimus in patients with advanced solid tumors and melanoma

Reshma Rangwala,[1,†] Yunyoung C Chang,[1,‡] Janice Hu,[1] Kenneth M Algazy,[1] Tracey L Evans,[1] Leslie A Fecher,[1,§] Lynn M Schuchter,[1] Drew A Torigian,[2] Jeffrey T Panosian,[2] Andrea B Troxel,[3] Kay-See Tan,[3] Daniel F Heitjan,[3] Angela M DeMichele,[1] David J Vaughn,[1] Maryann Redlinger,[1] Abass Alavi,[2] Jonathon Kaiser,[4] Laura Pontiggia,[5] Lisa E Davis,[1,4] Peter J O'Dwyer,[1] and Ravi K Amaravadi[1,*]

[1]Department of Medicine and the Abramson Cancer Center; Perelman School of Medicine; University of Pennsylvania; Philadelphia, PA USA; [2]Department of Radiology Perelman School of Medicine; University of Pennsylvania; Philadelphia, PA USA; [3]Center for Biostatistics and Epidemiology; University of Pennsylvania; Philadelphia, PA USA; [4]Department of Pharmacy Practice and Pharmacy Administration; Philadelphia College of Pharmacy; University of the Sciences; Philadelphia, PA USA; [5]Department of Mathematics, Physics, and Statistics; University of the Sciences; Philadelphia, PA USA

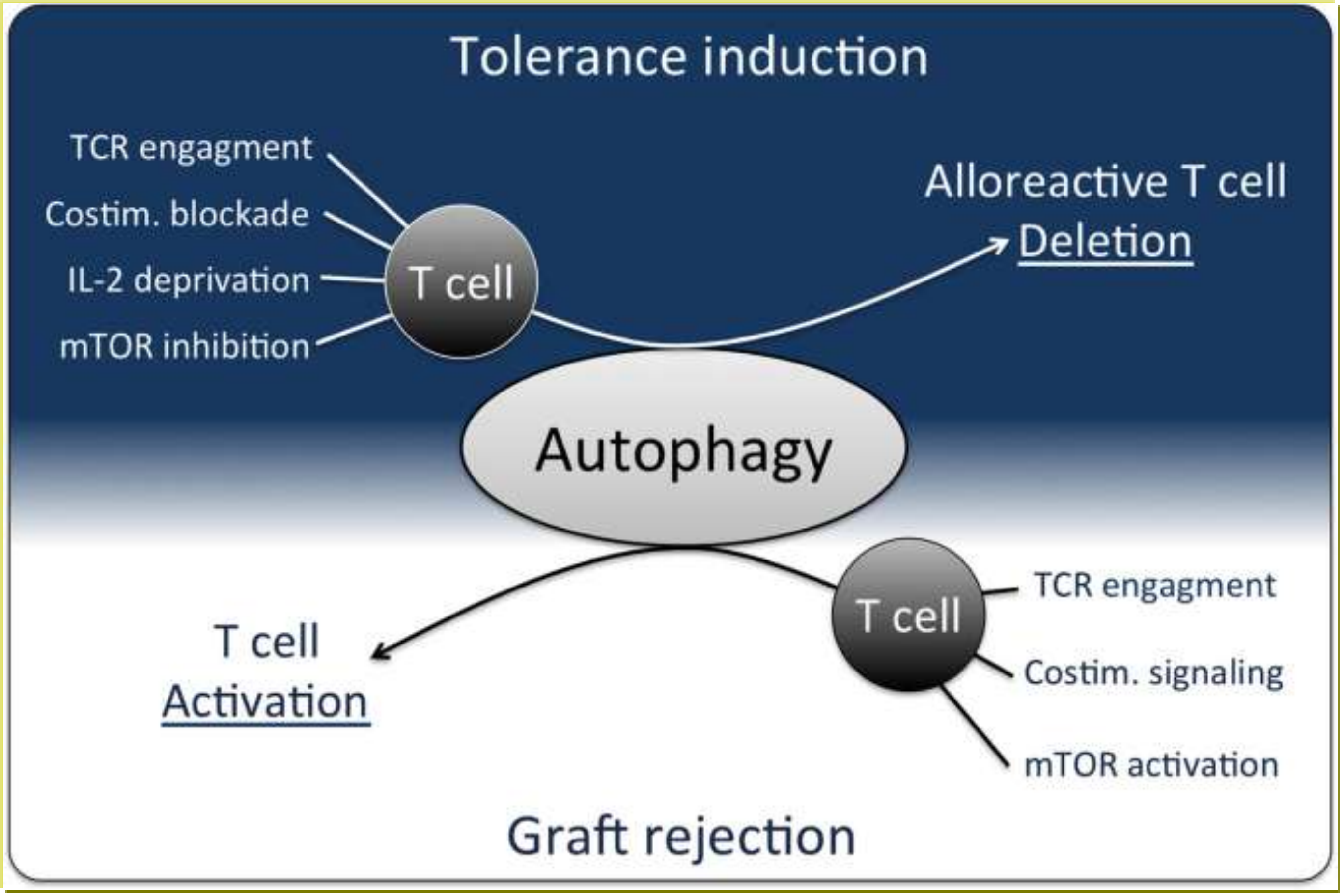
Current affiliation: [†]Merck; Philadelphia, PA USA; [‡]Boston University; Boston, MA USA; [§]Indiana University; Indianapolis, IN USA

siRNA based silencing of Mammalian target of rapamycin (mTOR): Implications for Tauopath

Dr. Mohamed Salama, Mansoura University

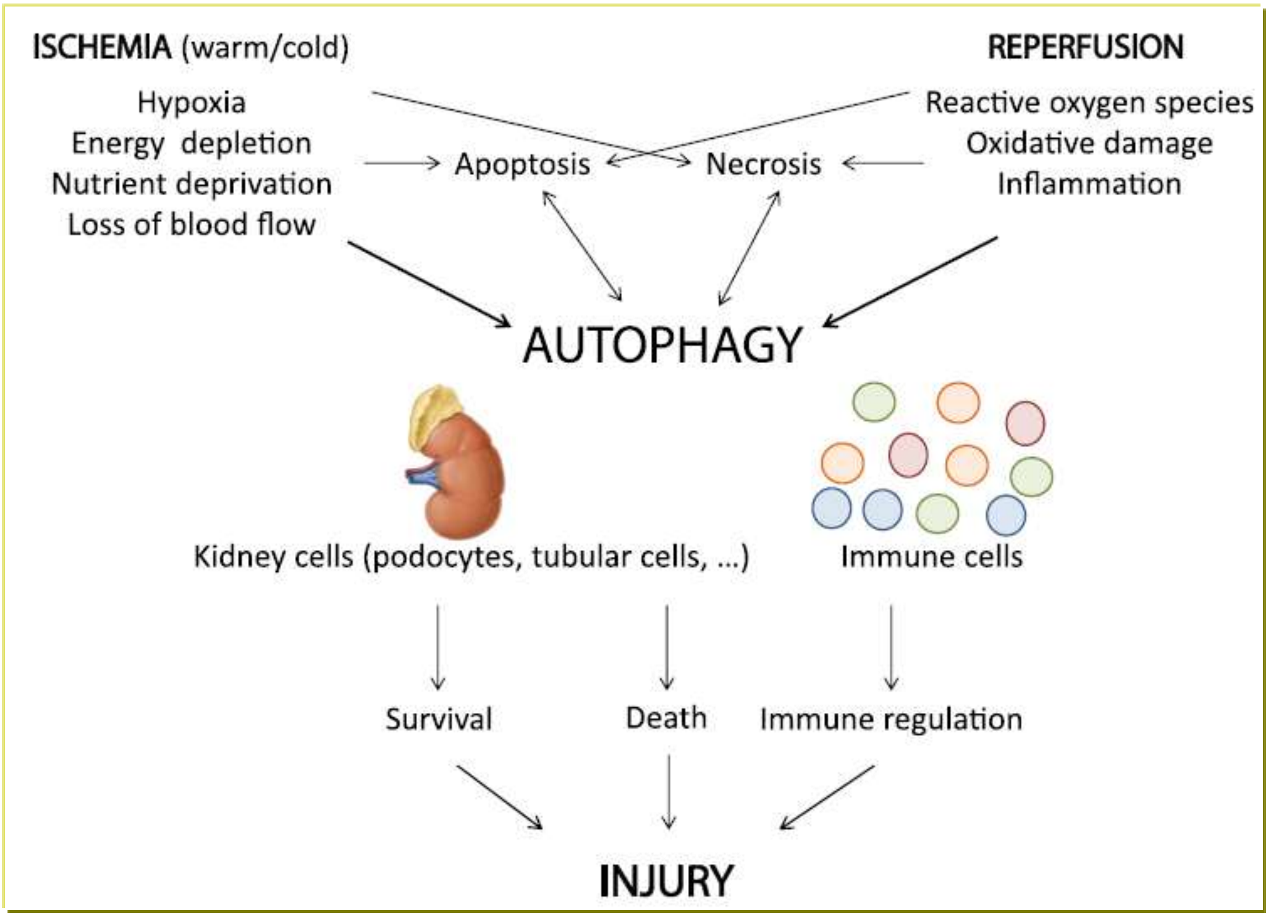
Autophagy and Transplantation

Autophagy:
Transplant Immunity



American Journal of Transplantation 2014; 14: 503–504

Autophagy Dysfunction: IRI



Am J Kidney Dis. October 2015;66(4):699-709

TRANSPLANT INTERNATIONAL

Transplant International ISSN 0934-0874

ORIGINAL ARTICLE

Inhibition of autophagy increases apoptosis during re-warming after cold storage in renal tubular epithelial cells

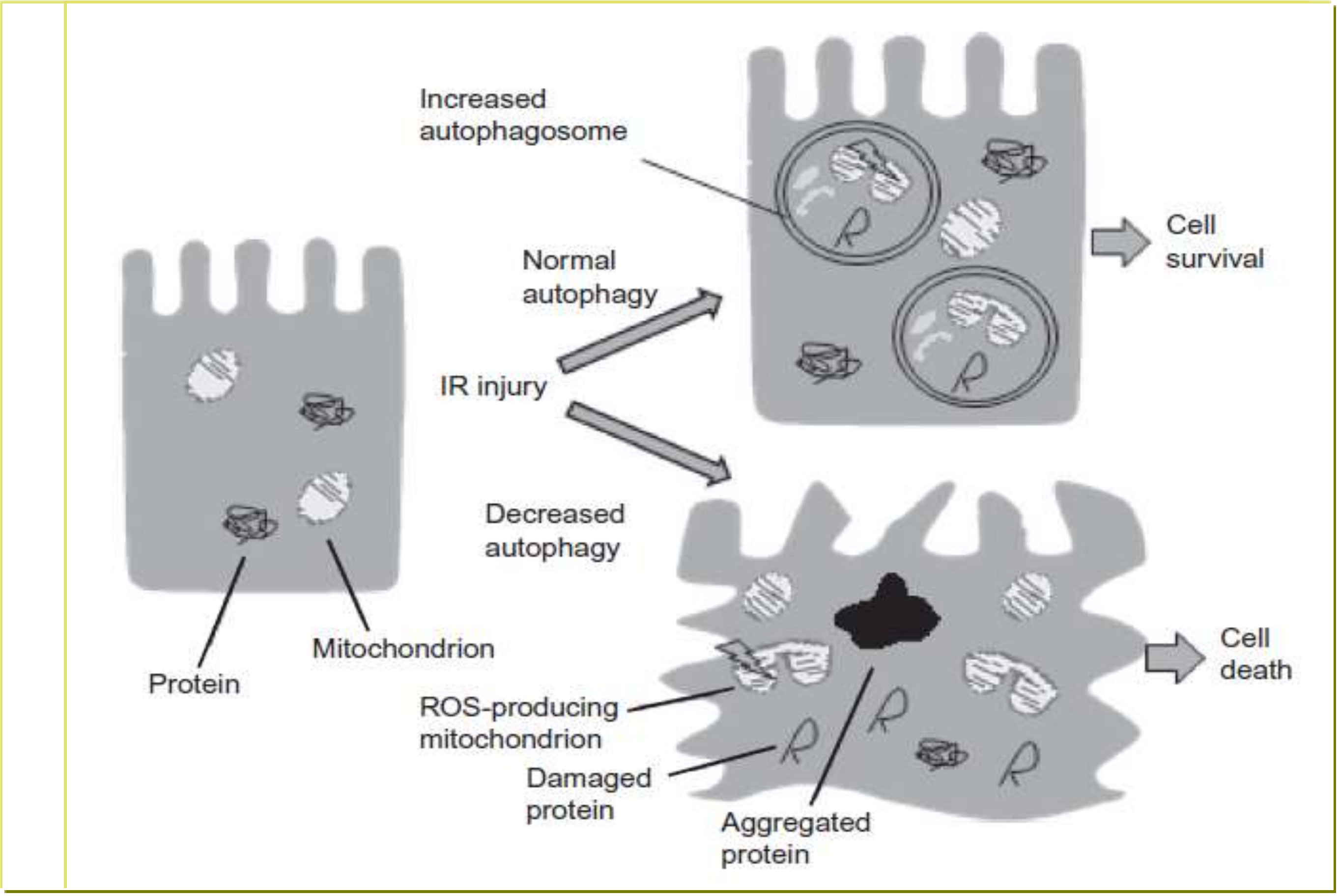
Swati Jain,[1] Daniel Keys,[1] Trevor Nydam,[1] Robert J. Plenter,[1] Charles L. Edelstein[1,2] and Alkesh Jani[1,2]

1 University of Colorado, Denver, CO, USA

2 Denver Veterans Affairs Medical Center, Denver, CO, USA

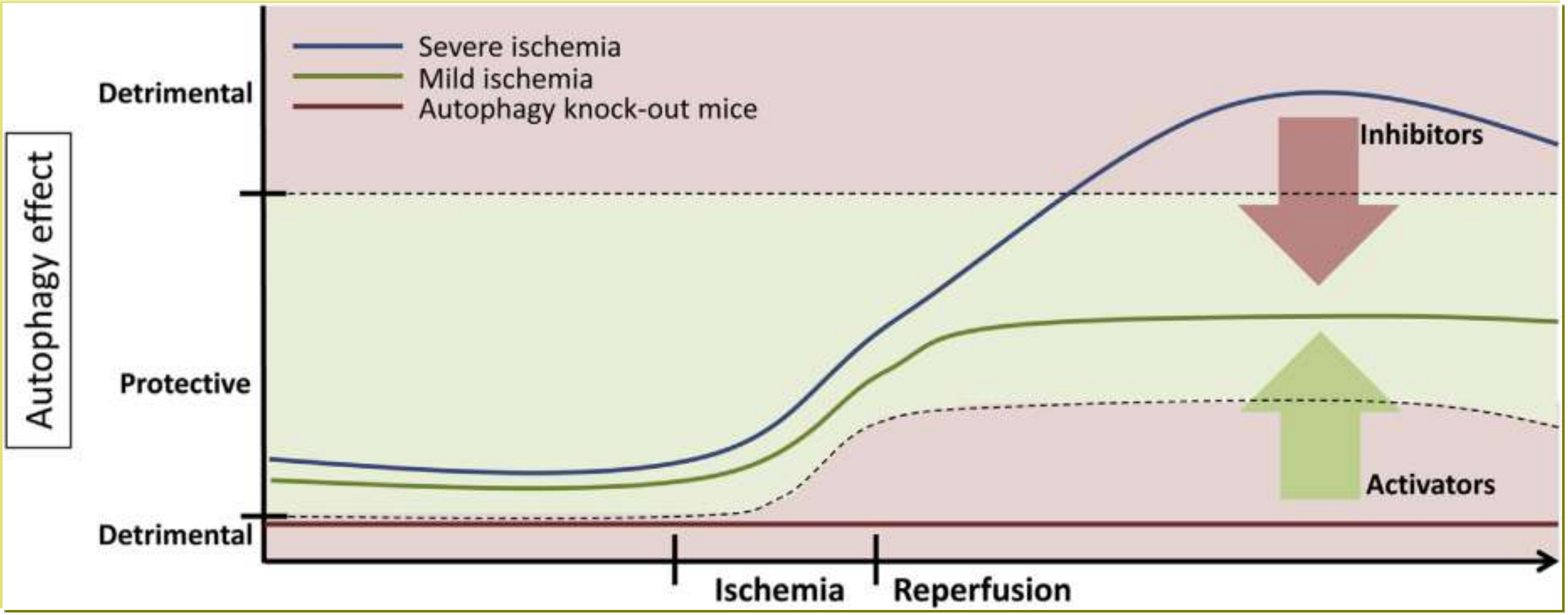
Transplant International ESOT 28 (2015) 214–223

Autophagy:
IRI and Immunosuppression



M.A. Hayat (ed): Autophagy, Volume 5. 2015 Elsevier Inc.

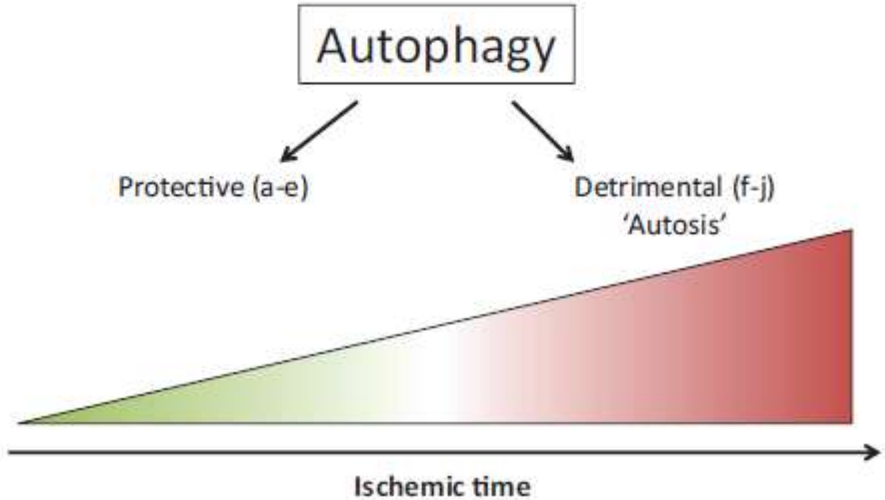
Autophagy Dysfunction: IRI



Am J Kidney Dis. October 2015;66(4):699-709

Autophagy:
IRI

Autophagy in Renal Ischemia-Reperfusion Injury: Friend or Foe?



Publication	Ischemia	Publication	Ischemia
(a) Liu S Autophagy 2012: 8(5)	25 min	(f) Nakagawa S Eur J Pharmacol 2012: 696(1-3)	40 min
(b) Jiang M Kidney Int 2012: 82(12)	25 min	(g) Chien CT Transplantation 2007: 84(9)	45 min
(c) Jiang M Am J Pathol 2010: 176(3)	30 min	(h) Isaka Y Transplant Proc 2009: 41(1)	45 min
(d) Kimura T J Am Soc Nephrol 2011: 22(5)	40 min	(i) Yeh CH Life Sci 2010: 86(3-4)	45 min
(e) Lempiainen J Acta Physiol 2013: 208(4)	40 min	(j) Wu HH J Biomed Sci 2009: 16(1)	60 min

American Journal of Transplantation 2014; 14: 1464–1465

Autophagy:
IRI

ARTICLE IN PRESS

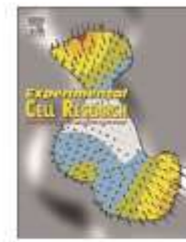
Experimental Cell Research ∎ (∎∎∎∎) ∎∎∎–∎∎∎

ELSEVIER

Contents lists available at ScienceDirect

Experimental Cell Research

journal homepage: www.elsevier.com/locate/yexcr



Research Article

MiR-21 inhibits autophagy by targeting Rab11a in renal ischemia/reperfusion

Xiujuan Liu[a,*], Quan Hong[b], Zhen Wang[a], Yanyan Yu[a], Xin Zou[a], Lihong Xu[a]

[a] Department of Nephrology, the 94th Hospital of Chinese PLA, The Changcheng Affiliated Hospital of Nanchang University, Nanchang 330002, China
[b] Department of Nephrology, Chinese PLA General Hospital, Chinese PLA Institute of Nephrology, State Key Laboratory of Kidney Diseases, National Clinical Research Center for Kidney Diseases, Beijing 100853, China

Urology and Nephrology Center

Ham *et al. Stem Cell Research & Therapy* (2015) 6:147
DOI 10.1186/s13287-015-0134-x

stem cell research&therapy

RESEARCH Open Access

let-7b suppresses apoptosis and autophagy of human mesenchymal stem cells transplanted into ischemia/reperfusion injured heart 7by targeting caspase-3

Onju Ham[1†], Se-Yeon Lee[1†], Chang Youn Lee[2†], Jun-Hee Park[2], Jiyun Lee[3], Hyang-Hee Seo[3], Min-Ji Cha[1,4], Eunhyun Choi[1,4], Soonhag Kim[1,4] and Ki-Chul Hwang[1,4*]

Autophagy:
Effect of Immunosuppressants

Rapamycin	Stimulation in vitro and in vivo
Tacrolimus	Stimulation in vivo in mouse brain
Mycophenolate mofetil	Stimulation of chaperone-mediated autophagy in vitro in hepatocytes
Dexamethasone	Stimulation in vitro in thymoma lymphocytes
	Stimulation of autophagy-dependent cell death in vitro in lymphoid leukemia cells
	Stimulation in vivo in rat soleus muscle
	Stimulation in vitro in primary osteocytes
	Stimulation in vitro in chondrocytes
Methylprednisolone	Stimulation in vivo in mouse osteocytes
	Inhibition of autophagy-dependent cell death in vivo in rat spinal cord
Azathioprine	Stimulation in vitro in hepatoblastoma cells
Cyclosporine A	Stimulation in vivo in rat acinar cells
	Stimulation in vitro in rat pituitary cells
	Inhibition of autophagic flux in vivo in mouse kidney
	Stimulation of autophagy-dependent cell death in vitro in glioma cells
	Stimulation of autophagy-dependent cell death in vitro in rat pituitary cells

Am J Kidney Dis. October 2015;66(4):699-709

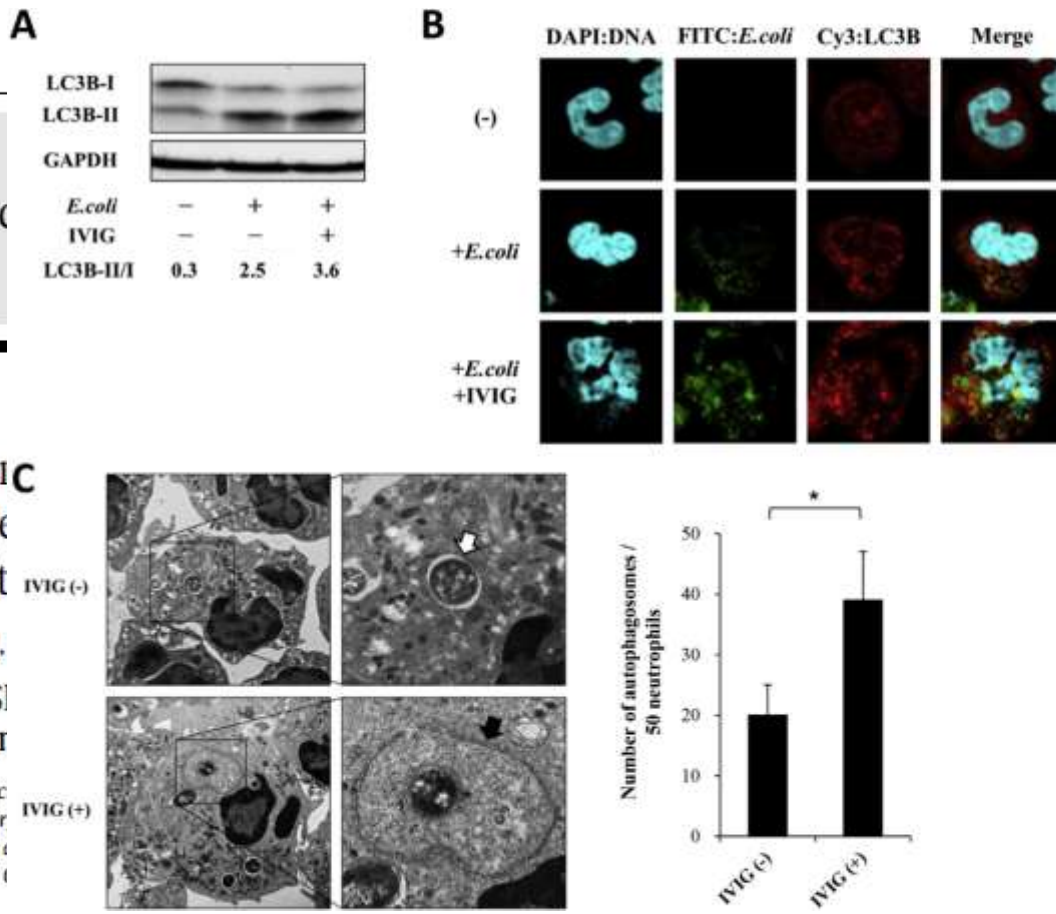
Rapamycin Causes Upregulation of Autophagy and Impairs Islets Function Both *In Vitro* and *In Vivo*

M. Tanemura[a,*], Y. Ohmura[a], T. Deguchi[a], T. Machida[a], R. Tsukamoto[a], H. Wada[a], S. Kobayashi[a], S. Marubashi[a], H. Eguchi[a], T. Ito[b], H. Nagano[a], M. Mori[a] and Y. Doki[a]

Departments of [a]Gastroenterological Surgery and [b]Complementary and Alternative Medicine, Osaka University Graduate School of Medicine, Osaka, Japan
**Corresponding author: Masahiro Tanemura, mtanemura@gesurg.med.osaka-u.ac.jp*

American Journal of Transplantation 2012; 12: 102–114

Bioc ... ons



Intravenous imi
autophagy of ne
patients against

Hidemasa Matsuo [a,]
Takeshi Higuchi [b], Sl
Akifumi Takaori-Koı

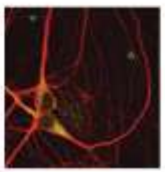
[a] Department of Human Health Sc
[b] Department of Clinical Laborator
[c] Department of Infection Control
[d] Department of Hematology and

CrossMark

Urology and Nephrology Center

Autophagy

Taylor & Francis



Autophagy

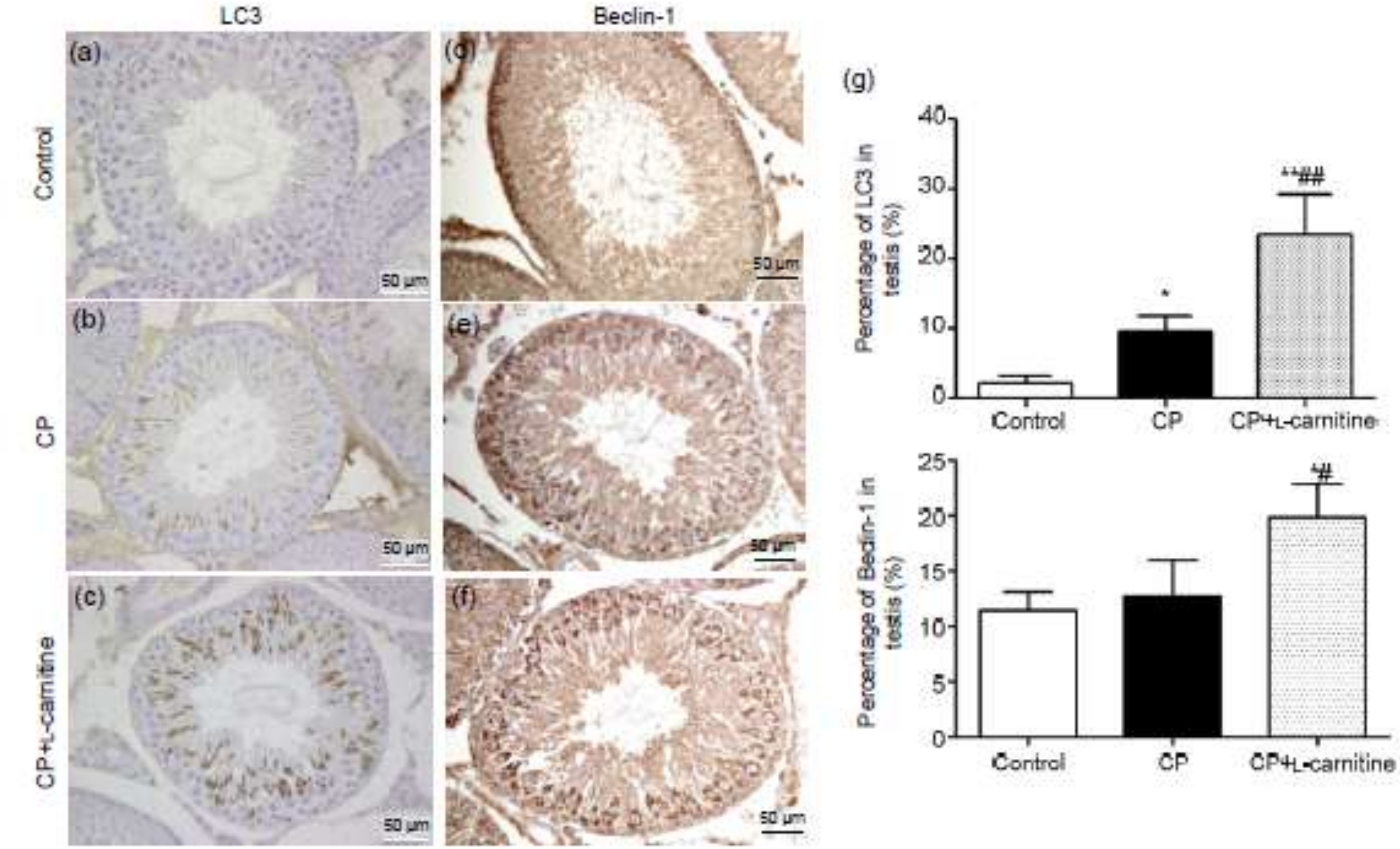
ISSN: 1554-8627 (Print) 1554-8635 (Online) Journal homepage: http://www.tandfonline.com/loi/kaup20

TMBIM6 (transmembrane BAX inhibitor motif containing 6) Enhances Autophagy and Reduces Renal Dysfunction in a Cyclosporine A-induced nephrotoxicity model

Raj Kumar Yadav, Geum-Hwa Lee, Hwa-Young Lee, Bo Li, Han-Eul Jung, Harun-Or Rashid, Min Kyung Choi, Binod Kumar Yadav, Woo-Ho Kim, Kyung-Woon Kim, Byung-Hyun Park, Won Kim, Yong-Chul Lee, Hyung-Ryong Kim & Han-Jung Chae

Autophagy 2015, in press

Autophagy:
L-Carnitine



J Zhejiang Univ-Sci B (Biomed & Biotechnol) 2015 16(9):780-787

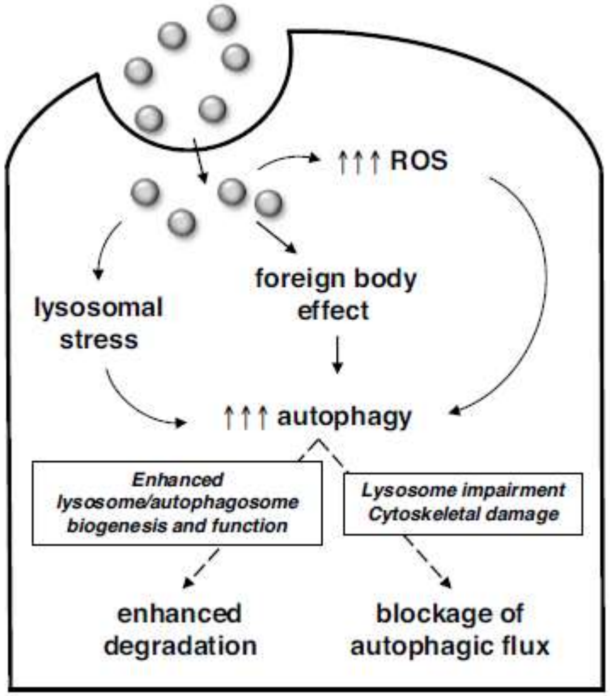
Autophagy Regulation

Autophagy:
Regulation

Available online at www.sciencedirect.com
ScienceDirect
ELSEVIER
Current Opinion in Biotechnology

Differential autophagic responses to nano-sized materials

Lauren Popp[1] and Laura Segatori[1,2,3]



Current Opinion in Biotechnology 2015, 36:129–136

Autophagy:
Therapeutic Modulation

Autophagy and Transplant Immunity

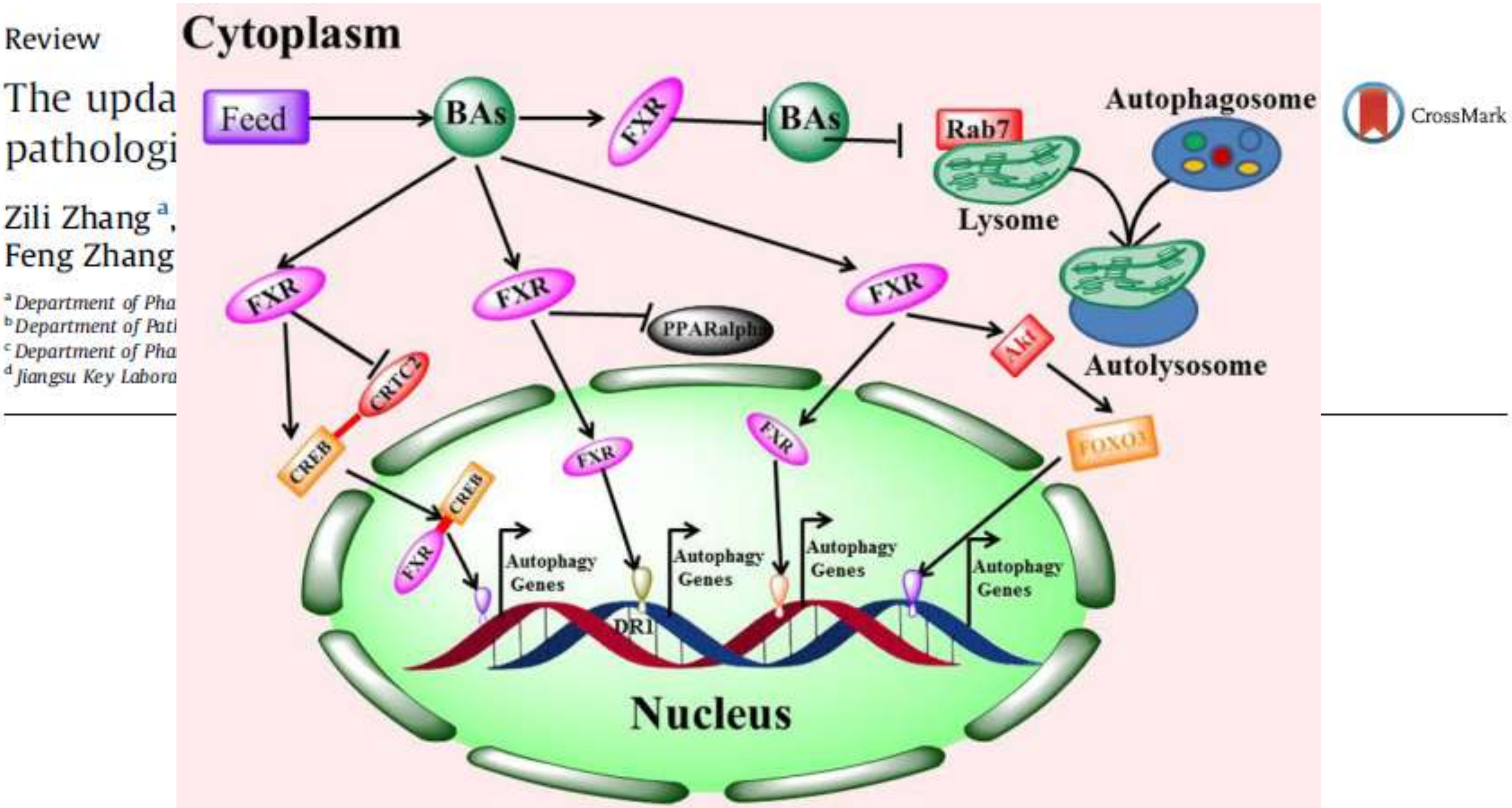
Therapeutic compounds and targets that modulate autophagy

Compound	Effect on autophagy	Mechanism of action and target
Hydroxychloroquine	Inhibitor	Lysosomal acidification
3-MA, Wortmannin	Inhibitor	Class III PI3K
Anti-TNFα	Inhibitor	Pro-autophagic cytokine block
P140 phosphopeptide	Inhibitor	Down-regulation of autophagic flux at the autolysosome stage
Tat-Beclin-1	Inducer	Interacts with a negative regulator of autophagy
Temsirolimus, sirolimus	Inducer	mTOR (incl. other actions)
Cyclosporine	Inducer	Mitochondrial permeability
Tamoxifen	Inducer	Beclin-1
Vitamin D	Inducer	mTOR inhibition
Bortezomib	Inducer	mTORC1 inhibition
Carbamazepine, valproate	Inducer	Inositol levels

3-MA, 3-methyladenine; PI3K, phosphatidylinositol 3-kinase; TNF, tumor necrosis factor; mTOR, mechanistic target of rapamycin; mTORC, mTOR complex.

American Journal of Transplantation 2014; 14: 1731–1739

Autophagy:
Regulation



Biomedicine & Pharmacotherapy 74 (2015) 17–29

Autophagy:
Regulation

Transcriptional regulation of autophagy.

Transcription factor	The effect of autophagy	The target genes	Conditions
FXR	Downregulation	*LCS, ATG4, ATG7, ATG10, Wipi1, Dfcp1, ULK1, LAMP2, P62, PI3KCIII, Bnip3*	Feeding or pharmacological activation
PPAR alpha	Upregulation	*ATG2, ATG4, ATG12, ATG16, Pink1, Bnip3, Wipi1, LC3, P13KCIII*	Fasting or pharmacological activation
PPAR beta/delta	Upregulation or downregulation	*ATG5, ATG7, LC3, Beclin1, P62, ULK1, Bnip3*	Depending on the different pathological conditions
PPAR gamma	Upregulation or downregulation	*ATG7, ATGI2, LC3, P62, ULK1, LAM PI, BCL2, Beclin1, Pink1*	Depending on the different pathological conditions
TFEB	Upregulation	*ATG4, ATG9, BCL2, LC3, SQSTM1, Wipi1, UVRAG*	Under different pathological conditions
NF-kappa B	Upregulation or downregulation	*BCL2, Bnip3, BECN1, SQSTM1*	Under different pathological conditions
HIF-Ialpha	Upregulation	*Bnip3, BCL2, LC3, Beclin1, PI3KCIII*	Under different pathological conditions
P53	Upregulation or downregulation	*ATG2, ATG4, ATG7, ATG10, BCL2, ULKI, DRAM1, AMPK*	Basal levels: downregulation pathological conditions: upregulation
FOXO	Upregulation	*ATG8, ATG12, ATG4B, Gabarapl1, VSP34, BECLINI*	Cytoplasm: downregulation Nucleus: upregulation
E2F	Upregulation or downregulation	*Bnip3, LC3, ULKI, DRAM, ATG1, ATG5*	Depending on the different pathological conditions
STAT	Downregulation	*ATG3, ATG12, BCL2, Bnip3, BECN1*	Cytoplasm: downregulation nucleus: downregulation
GATA	Upregulation or downregulation	*ATG4, ATG8, LC3, ATG12, Bnip3, ATG5, ATG7, BECNI*	CATA1: upregulation GATA4: downregulation

Biomedicine & Pharmacotherapy 74 (2015) 17–29

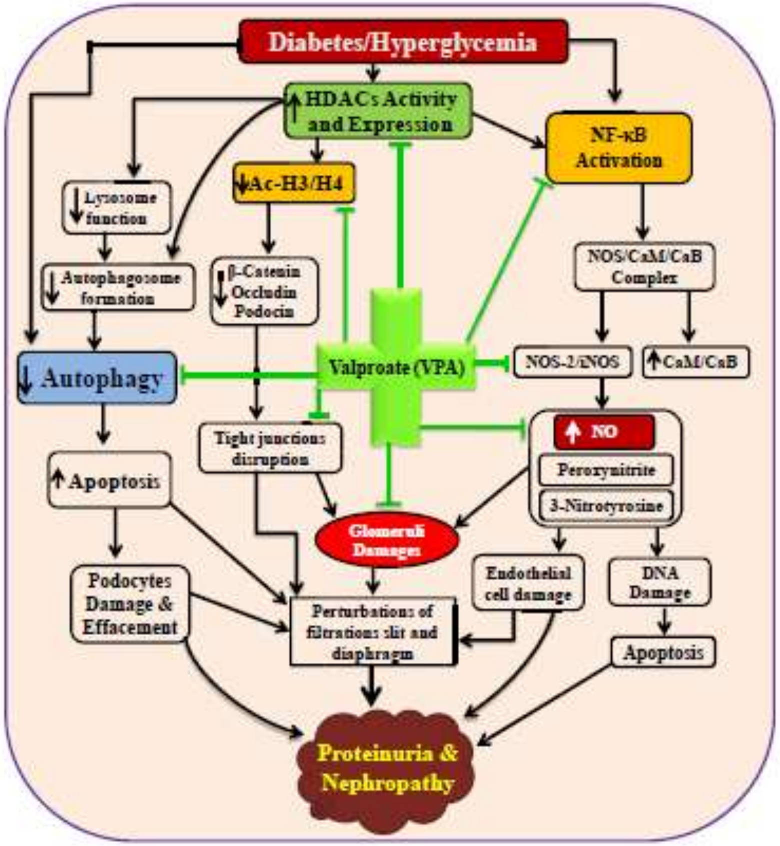
Autophagy:
Regulation

The Pro-apoptotic STK38 Kinase Is a New Beclin1 Partner Positively Regulating Autophagy

Carine Joffre,[1,5] Nicolas Dupont,[2] Lily Hoa,[3] Valenti Gomez,[3] Raul Pardo,[4] Catarina Gonçalves-Pimentel,[4] Pauline Achard,[5] Audrey Bettoun,[1] Brigitte Meunier,[1] Chantal Bauvy,[2] Ilaria Cascone,[1] Patrice Codogno,[2,*] Manolis Fanto,[4,*] Alexander Hergovich,[3,*] and Jacques Camonis[1,*]
[1]INSERM U830, Institut Curie, Paris 75248, France
[2]INSERM U1151-CNRS UMR 8253, Institut Necker Enfants-Malades, Paris 75993, France
[3]University College London, Cancer Institute, London WC1E 6BT, UK
[4]Department of Basic and Clinical Neuroscience, Kings College London, London SE5 9NU, UK
[5]Cancer Research Center of Toulouse, UMR1037, Toulouse 31037, France

Current Biology 25, 1–14, October 5, 2015

Autophagy:
Regulation



Biochimie 110 (2015) 1e16


UAR 1971
الجمهورية العربية المتحدة ١٩٧١
WHO
مرض السكر
DIABETES
MESY RA
PHYSICIAN
3000 BC
20 M
POSTAGE
APERS PAPAYRUS بردية إيبرس
بريد


SUCCESS
belongs only to
those who are
willing to
work harder
than anyone
else